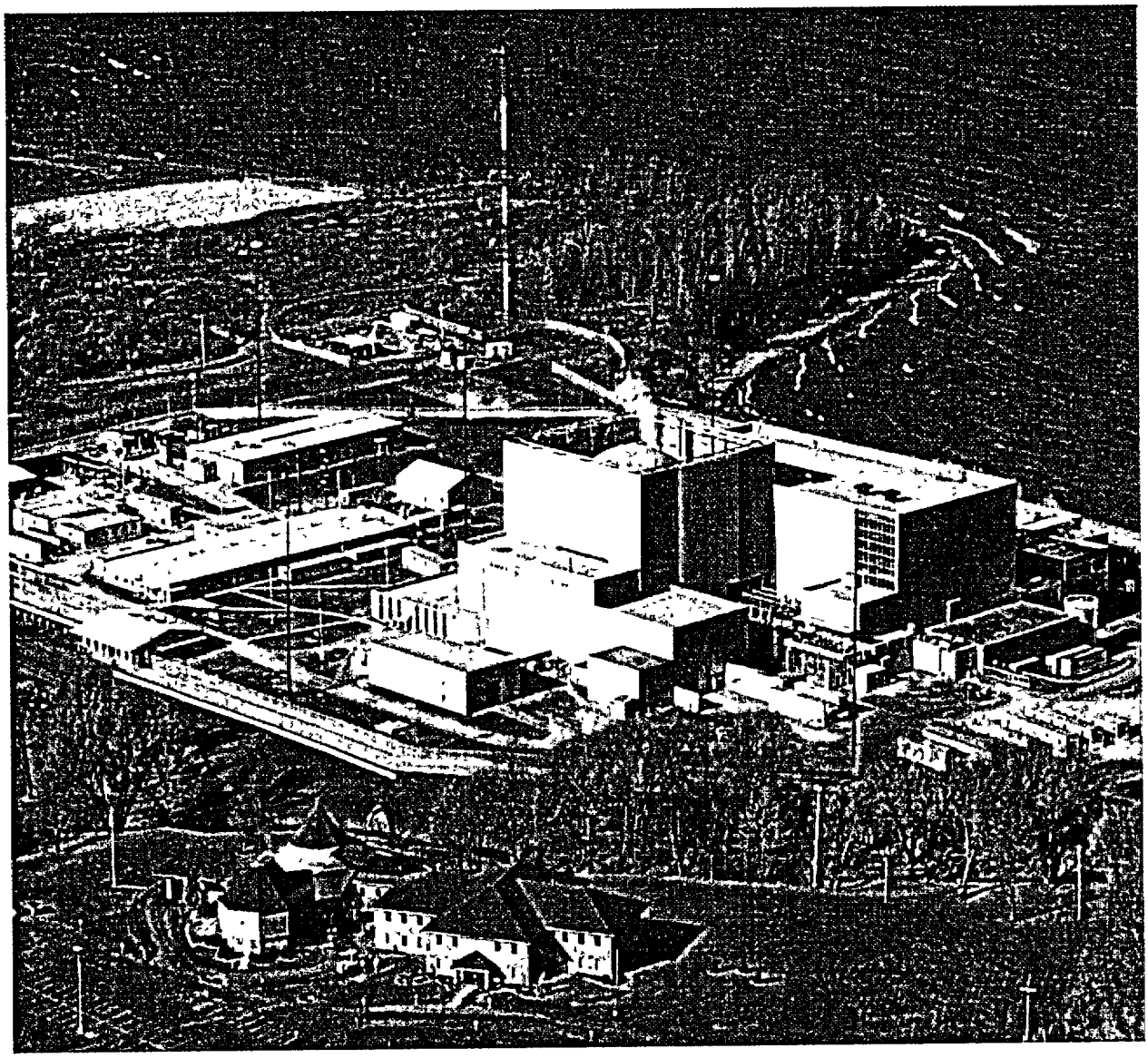
R. E. Ginna Nuclear Power Plant



Application for Renewed Operating License

Volume 2

Section 3 – Aging Management Review Results
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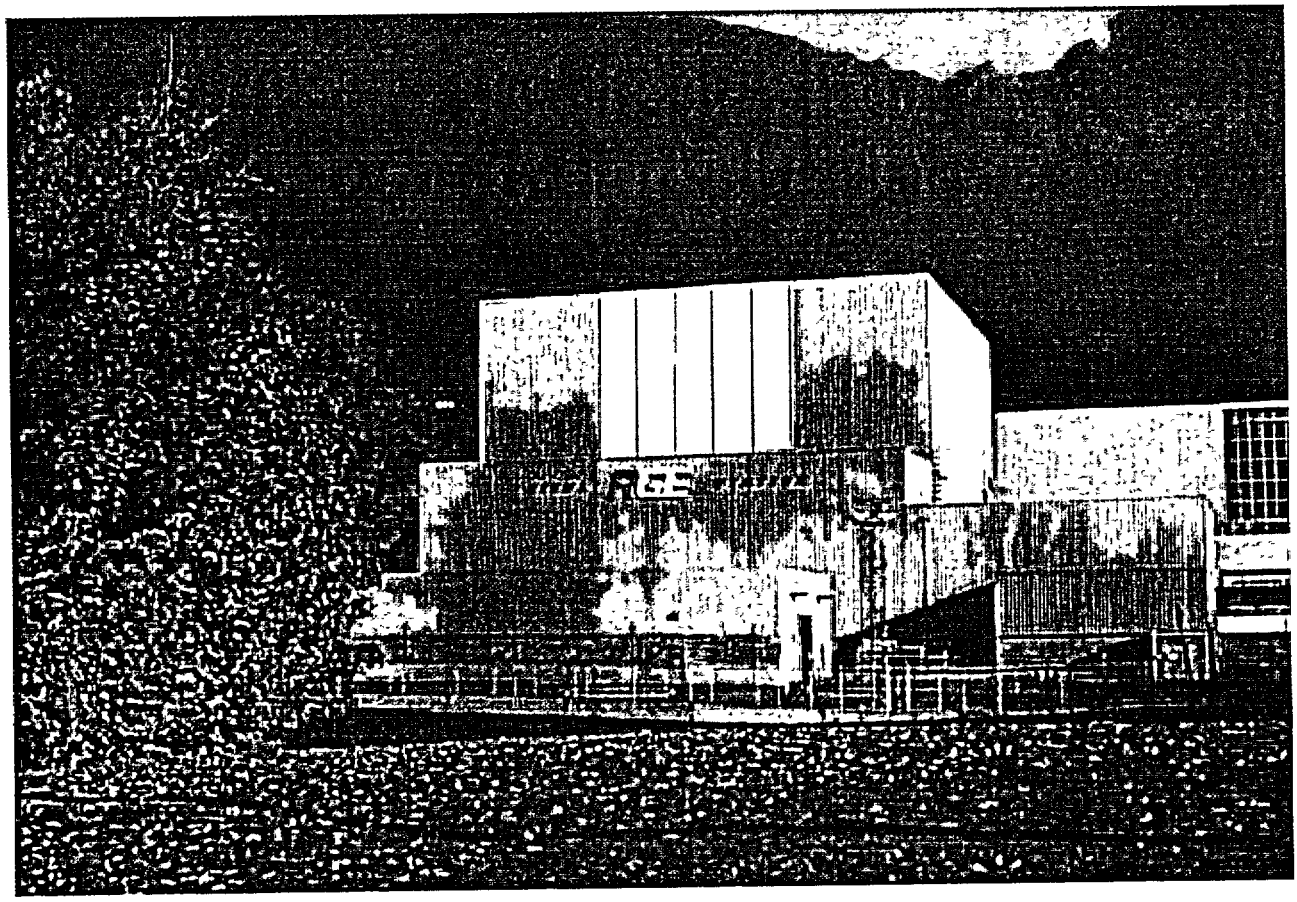
APPLICATION FOR RENEWED OPERATING LICENSE



R. E. GINNA NUCLEAR POWER PLANT

3.0 AGING MANAGEMENT REVIEW RESULTS

For those structures and components that are subject to aging management review, paragraph 54.21(a)(3) of the license renewal rule requires demonstration that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

This chapter describes the results of the aging management reviews for structures and components that were identified in Chapter 2, Structures and Components Subject to Aging Management Review.

3.1 Review Methodology

The overall process by which aging effects requiring management were identified and evaluated is summarized in this section.

3.1.1 Determination of Materials of Construction

Material(s) of construction were identified for all systems, structures and components subject to aging management review. Sources of information used to identify materials of construction included original Westinghouse and Gilbert Associates, Inc. (GAI) equipment and material specifications, vendor technical manuals and drawings, fabrication drawings, piping and instrument drawings, and piping line specifications. Field walkdowns were also used to identify/verify materials of construction for some components.

3.1.2 Determination of Operating Environments

Internal operating environments were defined by fluid medium and chemistry (i.e., treated water, raw water, lubricating oil and fuel oil, air/gas, etc.), service temperature, and condition of fluid flow. External environments were defined by plant location, including temperature and humidity (i.e., indoor with no air-conditioning, outdoor with exposure to weather), exposure to soil/soil water (i.e., buried), embedment in concrete, and exposure to borated water leaks.

Table 3.1-1 and Table 3.1-2 contain descriptions of the internal and external service environments at Ginna Station which are used in subsequent sections of this chapter. Within this Application, some of the internal environments have been subdivided into subgroups based on the fluid chemistry or flow rate. The subgroups are identified in the Description column in Table 3.1-1.

3.1.3 Component Grouping by Material/Environment Combination

The aging mechanisms and effects that apply to a structure or component are determined by the material(s) of construction and operating environment (including temperature and stress) to which the material is exposed. Structures or components constructed of the same material and exposed to the same environment would therefore be susceptible to the same aging mechanisms and effects. As a result, structures and components were grouped together according to material/environment combinations. This facilitated the aging management review process, in that a single aging management review could be performed for an entire group of structures or components.

3.1.4 Aging Effects Analysis - Non-Class 1 Mechanical Systems and Components

Aging effects requiring management for Non-Class 1 systems and components were determined using the evaluation processes described in standard industry guidance for aging evaluation of mechanical systems and components. Systems and components were evaluated by applying a set of material/environment-based rules derived from known age-related degradation mechanisms documented in the technical literature and published industry operating experience. A plant-specific review of this guidance document was conducted to demonstrate applicability of this document at Ginna Station and to provide corrections and/or enhancements to criteria for evaluating aging of specific materials in certain environments (see Section 3.1.9).

3.1.4.1 Treated Water Systems

In accordance with NUREG-1801 for treated water systems, aging mechanisms and effects were identified and evaluated without crediting the mitigative effects of water chemistry controls.

3.1.4.2 Protective Coatings

Coatings are used at Ginna Station to protect the surfaces of steel components in mechanical systems and structures. Although the benefits derived from protective coatings are recognized, coatings, in and of themselves, do not perform License Renewal intended functions. Therefore, protective coatings are not credited with managing the effects of aging. However, the condition of steel surfaces protected by coatings is evaluated during inspections directed by aging management programs at Ginna Station. When evidence of superficial surface corrosion caused by coating degradation is found, the coating is evaluated and repaired in accordance with plant procedures. That notwithstanding, protective coatings applied to surfaces in containment are managed within the current licensing basis. This is further discussed in Appendix B2.1.24.

3.1.5 Aging Effect Analysis - Essential Structures

Aging effects requiring management for Essential Structures (including Yard Structures) were determined using the evaluation processes described in standard industry guidance for aging evaluation of structures and structural components. Aging mechanisms and effects identified in the EPRI document for structural materials were derived from a number of sources, including collective nuclear plant operating experience and relevant operating experience from other industries. A plant-specific review of this guidance document was conducted to evaluate applicability of various aging mechanisms at Ginna Station (see Section 3.1.9).

3.1.6 Aging Effects Analysis - Class 1 Systems, Structures and Components

Aging effects requiring management for Class 1 mechanical systems, components and the Containment Structure were determined using the information and guidance presented in Westinghouse Generic Topical Reports (GTRs). The following Class 1 components were evaluated using the GTRs:

- Containment Structure
- Reactor Pressure Vessel
- Reactor Vessel Internals
- Reactor Coolant System Piping
- Reactor Coolant System Supports
- Steam Generators
- Pressurizer

The GTRs have undergone extensive peer review and, in some cases, NRC review. In addition, they contain thorough reviews of equipment maintenance histories as well as discussions and assessments of industry/regulatory issues. For those GTRs with U. S. NRC Final Safety Evaluation Reports (FSERs), detailed responses to all Applicant Action Items were prepared.

3.1.7 Industry and Plant-Specific Operating Experience Review

A thorough review of appropriate industry and plant-specific operating experience was conducted to confirm that applicable aging effects had been identified. Industry operating experience sources included NRC Generic Publications, INPO Significant Operating Event Reports (SOER), EPRI Technical Reports, Westinghouse Generic Technical Reports (GTRs), and NUREG-1801 (Generic Aging Lessons Learned (GALL) report). Plant-specific operating experience sources included Reports to AEC/NRC, Abnormal Occurrence and Licensee Event Reports (LERs), Non-Conformance Reports (NCRs), Corrective Action

Reports (CARs), Refueling, Inspection and Overhaul Reports (RIOs), Inservice Inspection (ISI) Reports, Identified Deficiency Reports (IDRs), and ACTION Reports (ARs) from 1969 to the present. This review was conducted not only to confirm that the aging effects determined by material/environment-based rules were appropriate, but also to assure that any additional plant-specific aging mechanisms and related effects were identified for management.

3.1.8 Assignment of Aging Management Programs

Appropriate aging management program(s) credited for managing each aging effect were assigned to each structure or component evaluated in the aging management review process. Aging management programs are described in Appendix B of this Application.

3.1.9 Standard Industry Guidance Document Review (Mechanical Systems and Components)

A technical review of standard industry guidance for aging evaluation of mechanical systems and components was conducted to demonstrate that the materials and internal/external operating environments evaluated in the document were applicable and bounding for Ginna Station. In addition, an evaluation of the aging mechanisms identified for specific materials in certain environments was performed. Positions were developed for mechanisms such as stress corrosion cracking (SCC) and intergranular attack/stress corrosion cracking (IGA/IGSCC) of austenitic stainless steels in treated and raw water environments. A position was also established for SCC of bolting materials.

3.1.9.1 Position on SCC of Austenitic Stainless Steel

The threshold temperature for the onset of stress corrosion cracking of austenitic stainless steels in the presence of halides (>150 ppb) and sulfates (>100 ppb) is generally agreed to be approximately 140°F (Reference 1 and Reference 2). The validity of this threshold temperature is also supported by industry operating experience. This threshold temperature has been applied to austenitic stainless steels in all environments evaluated in this LRA. However, it should be noted that the Water Chemistry Control Program (supplemented by one-time inspections in stagnant or low-flow areas) is the aging management program credited for managing cracking due to SCC in treated water systems. This aging management approach is consistent with NUREG-1801.

3.1.9.2 Position on IGA/IGSCC of Austenitic Stainless Steels

Cracking of austenitic stainless steels due to IGA/IGSCC requires a threshold level of grain boundary sensitization and a threshold temperature of approximately 140°F (Reference 1 and Reference 2). IGA/IGSCC is not a credible aging mechanism for welded austenitic stainless steel piping and components at Ginna Station due to controls imposed on heat input and interpass temperature during fabrication which limited grain boundary sensitization in heat affected zones of welded joints. Susceptibility of austenitic stainless steels to IGA/IGSCC may be increased only after prolonged exposure to elevated temperatures above 482°F.

3.1.9.3 Position on SCC of SA 193 Grade B7 Bolting Materials

Although there have been a few reported cases of cracking of bolting in the industry caused by SCC, these have been attributed to susceptible high yield stress materials exposed to aggressive environments, such as lubricants containing molybdenum disulfide. One such case occurred at Ginna Station early in plant life. The bolting which cracked was high-strength (ASTM A 490) RCP embedment anchor studs which had been improperly heat treated, installed with excessive preload, and exposed to borated water leakage. The failure mechanism was determined to be SCC. Replacement A-490 bolting (properly heat-treated and installed with proper preload) has not cracked.

However, a survey of industry experience, technical literature, and laboratory corrosion studies (documented in EPRI Report NP-5769) indicates that SCC should not be a concern for closure bolting in nuclear power plant applications if the specified minimum yield strength is <150 Ksi. For quenched and tempered low-alloy steels typically used for closure bolting (e.g., SA193, Grade B7), susceptibility to SCC is controlled by yield strength. The minimum yield strength specified in SA193 for Grade B7 material is 105 Ksi, which is well below the threshold value of 150 Ksi identified in EPRI Report NP-5769. Furthermore, the selection and use of fastener lubricants for pressure boundary components has been controlled by the Ginna Station Quality Assurance Program since 1983 as part of the response to IE Bulletin 82-02. Limits are also imposed on levels of contaminants such as chlorides and sulfur compounds (including molybdenum disulfide) in lubricants and sealant compounds. Therefore, it is reasonable to conclude that failure by SCC should not be a significant issue for SA193 Grade B7 bolting materials. Ginna Station operating experience supports this conclusion.

3.1.10 Standard Industry Guidance Document Review (Structures and Structural Components)

A technical review of standard industry guidance for aging evaluation of structures and structural components was conducted to evaluate the applicability of aging mechanisms identified for structural materials at Ginna Station. This included a review of original construction contractual requirements, specifications for concrete structures and other materials, site-specific environments, and plant operating experience. Certain aging mechanisms/effects were determined not to be applicable at Ginna Station. Nevertheless, appropriate aging management/monitoring programs are credited for verification that these mechanisms/effects do not, in fact, result in age-related degradation.

3.1.11 Standard Industry Guidance Document Review (Electrical Commodities)

A technical review of standard industry guidance for aging evaluation of electrical commodities was conducted to evaluate the applicability of aging mechanisms identified for electrical components at Ginna Station. This included a review of original construction requirements, specifications for selected electrical components and other insulating materials, site-specific environments, and plant operating experience. Certain aging mechanisms/effects were determined not to be applicable at Ginna Station. Nevertheless, appropriate aging management/monitoring programs are credited for verification that these mechanisms/effects do not, in fact, result in age-related degradation.

3.1.12 Generic Component Assets

It was recognized that certain items/assets such as carbon/low-alloy steel closure bolting or other carbon steel components are present in almost every mechanical system or structure and therefore may be conveniently treated as commodity groups. To facilitate aging management review of such items, generic assets were created in every system and structure to account for the presence of closure bolting and external surfaces of carbon steel components which are subject to the effects of aging. Carbon steel components (CS components) are identified as a specific commodity group to ensure that carbon steel components potentially exposed to borated water leaks are evaluated. The normal external operating environment is evaluated with the specific system-identified components.

Aging effects requiring management for closure bolting were assigned to the generic asset in each system/structure and appropriate aging management programs were identified and credited. For borated water systems or non-borated water systems in close proximity to borated water systems, the potential for boric acid corrosion of carbon/low-alloy steel closure bolting, structural bolting, and external surfaces of equipment and structural

members was recognized and accounted for by assigning the applicable aging effects to the generic assets. Appropriate aging management programs were then identified and credited.

Aging management review results for Reactor Coolant Systems are contained in Section 3.2, for Engineered Safety Features Systems in Section 3.3, for Auxiliary Systems in Section 3.4, for Steam and Power Conversion Systems in Section 3.5, for Structures and Component Supports in Section 3.6, and for Electrical and Instrument and Controls Systems in Section 3.7.

3.1.13 Review of NUREG-0933

NUREG-0933 has been reviewed in accordance with the guidance provided in Appendix A.3 of the Standard Review Plan. As a result of this review, the following generic safety issues (GSI) have been evaluated for license renewal and have been addressed in the LRA:

- GSI-168, Environmental Qualification of Electrical Equipment, is addressed in Section 4.4, Environmental Qualification (EQ) of Electric Equipment.
- GSI-190, Fatigue Evaluation of Metal Components for 60-Year Plant Life, is addressed in Section 4.3.7, Environmentally Assisted Fatigue.
- GSI-191, Assessment of Debris Accumulation on PWR Sump Performance, is addressed in Appendix B2.1.24, Protective Coatings Monitoring and Maintenance Program

Table 3.1-1 Internal Service Environments

Environment	Description
Treated Water - Primary, T<140°F	Treated water containing boric acid in the Reactor Coolant System (RCS), T<140°F. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Water Chemistry Control Program. Includes consideration of Stagnant, Low Flow <3 fps.
Treated Water - Primary, T>480°F	Treated water containing boric acid in the Reactor Coolant System (RCS), T>480°F. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Water Chemistry Control Program. Includes consideration of Stagnant, Low Flow <3 fps.
Treated Water - Primary, 140°F<T<480°F	Treated water containing boric acid in the Reactor Coolant System (RCS), 140°F<T<480°F. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Water Chemistry Control Program. Includes consideration of Stagnant, Low Flow <3 fps.
Treated Water - Secondary, T>120°F	Demineralized, deaerated water; secondary water chemistry is monitored and controlled in accordance with the requirements of the Ginna Station Optimized Secondary Water Chemistry Program (included in the Water Chemistry Control Program) and includes High Energy Piping in Main Steam, Feedwater, Blowdown, Auxiliary Feedwater, Condensate, and Sample System - Secondary. Includes steam and consideration of Stagnant, Low Flow, <3 fps.
Treated Water - Secondary, T<120°F (Stagnant, Low Flow <3 fps)	Demineralized, deaerated water; secondary water chemistry is monitored and controlled in accordance with the requirements of the Ginna Station Optimized Secondary Water Chemistry Program (included in the Water Chemistry Control Program). Includes portions of Aux Feedwater, Condensate, and Sample System - Secondary
Treated Water - Borated, T<140°F (Stagnant, Low Flow <3 fps)	Treated water containing boric acid in systems other than the RCS, i.e., Sample System NSSS, CVCS Charging and Letdown, Residual Heat Removal, Safety Injection, Spent Fuel Cooling, Containment Spray, and Waste Disposal Systems. Borated water chemistry is monitored and controlled in accordance with the requirements of the Ginna Station Primary Water Chemistry Control Program.
Treated Water - Borated, T>140°F (Stagnant, Low Flow <3 fps)	Stagnant, low flow (<3 fps) treated water containing boric acid in systems other than the RCS, i.e., Sample System NSSS, CVCS Charging and Letdown, Residual Heat Removal, Safety Injection, Spent Fuel Cooling, Containment Spray, and Waste Disposal Systems. Borated water chemistry is monitored and controlled in accordance with the requirements of the Ginna Station Primary Water Chemistry Control Program.

Table 3.1-1 Internal Service Environments

Environment	Description
Treated Water - Other	Treated water is demineralized water which may be deaerated and include corrosion inhibitors and biocides or some combination of these treatments. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Primary Water Chemistry Control Program. Ginna Station treated water systems include Primary Makeup Water, Emergency Diesel Generator Cooling Water, Component Cooling Water, and Chilled Water.
Treated Water - Other (Stagnant, Low Flow <3 fps)	Treated water is demineralized water which may be deaerated and include corrosion inhibitors and biocides or some combination of these treatments. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Primary Water Chemistry Control Program. Ginna Station treated water systems include Primary Makeup Water, Emergency Diesel Generator Cooling Water, Component Cooling Water, and Chilled Water.
Treated Water - Other (High velocity, change in flow direction)	Treated water is demineralized water which may be deaerated and include corrosion inhibitors and biocides or some combination of these treatments. The chemistry of this water is monitored and controlled in accordance with the requirements of the Ginna Station Primary Water Chemistry Control Program. Ginna Station treated water systems include Primary Makeup Water, Emergency Diesel Generator Cooling Water, Component Cooling Water, and Chilled Water.
Raw Water (Flowing, >3 fps)	Raw water at Ginna Station includes the lake water used both for Circulating Water (in the main condensers) and for the Service Water System, as well as city water used for the Fire Protection System. The Standby Auxiliary Feedwater System also contains raw water.
Raw Water (Stagnant, low flow <3 fps)	Raw water at Ginna Station includes the lake water used both for Circulating Water (in the main condensers) and for the Service Water System, as well as city water used for the Fire Protection System. The Standby Auxiliary Feedwater System also contains raw water.
Raw Water (High velocity, change in flow direction)	Raw water at Ginna Station includes the lake water used both for Circulating Water (in the main condensers) and for the Service Water System, as well as city water used for the Fire Protection System. The Standby Auxiliary Feedwater System also contains raw water.
Raw Water Drainage	Fluids collected in building drains. These can be treated waters (primary, borated, secondary, or other), raw water (service water, city water), fuel oil or lubricating oil.
Lubricating Oil and Fuel Oil	This category comprises either lubricating oil or diesel fuel oil. Ginna Station systems with this internal environment include the Emergency Diesel Generator (EDG) Fuel Oil and Lube Oil System, and Diesel Fire Pump Fuel Oil and Lube Oil System.

Table 3.1-1 Internal Service Environments

Environment	Description
Lubricating Oil and Fuel Oil - Pooling	This category comprises either lubricating oil or diesel fuel oil with the potential for pooling of water.
Air and Gas	The environments in this category include atmospheric (breathing) air, dry/ filtered instrument air, nitrogen, carbon dioxide, hydrogen, helium and halon. Ginna Station systems exposed to this internal environment include the Instrument Air, Breathing Air, Nitrogen, EDG Air Start System, Control Room HVAC, Computer/Cable Spread Room HVAC, CRDM Cooling, Containment Purge, Emergency Containment Coolers, Emergency Containment Filters, Containment Post Accident evaluation, the Normal Containment Coolers, portions of Waste Disposal, Fire Suppression, and Refrigerated Systems. Note that air operated valves assigned to balance of plant systems are also exposed to this environment.
Air and Gas - Wetted Environment	Moist atmospheric air, unfiltered
Air and Gas - Wetted Environment, T>140°F	Moist atmospheric air, unfiltered, T>140°F

Table 3.1-2 External Service Environments

Category	Description
Outdoor	Moist air, temperature: 0-91°F, 5-100% relative humidity. Exposed to weather including precipitation and wind.
Indoor - No Air Conditioning	Moist air, temperature: 50-104°F, 60% nominal humidity. Not exposed to weather.
Indoor - Air Conditioning	Specific temperature range/humidity dependent upon building/room. Typically, temperature: 70-78°F, 60% relative humidity. Not exposed to weather.
Containment	Moist air, temperature: 60-120°F, 50% nominal humidity, Radiation - total integrated dose 1 rad per hour max. (excluding equipment located inside the reactor cavity). Not exposed to weather.
Buried	Exposed to soil/fill or ground water
Borated Water Leaks	Potentially exposed to borated water leaks
Embedded	Embedded/encased in concrete

Section 3.1 References

1. D. Peckner and I.M. Bernstein, Handbook of Stainless Steels, McGraw Hill, 1977.
2. A.J. Sedricks, Corrosion of Stainless Steels, John Wiley & Sons, 1979, pp. 152-156.

3.2 Aging Management of Reactor Coolant System

The results of the aging management review of the Reactor Coolant System components are provided in this section and summarized in Tables 3.2-1 and 3.2-2. Table 3.2-1 shows the aging management of system components evaluated in NUREG-1801 that are relied on for license renewal of the Reactor Coolant System components at Ginna. Included in the table is a discussion column. The discussion column will provide a conclusion indicating if the aging management evaluation results are consistent with NUREG-1801 along with any clarifications or explanations required to support the stated conclusion if that conclusion is different than those of the NUREG. For a determination to be made that a table line item is "Consistent with NUREG-1801" several criteria must be met. First the plant specific component is reviewed against the GALL to ensure that the component, materials of construction and internal or external service environment are comparable to those described in a particular GALL item. Second, for those that are comparable, the results of the plant aging management review- aging effect evaluation are compared to the aging effects/mechanisms in the GALL. Finally, the programs credited in the GALL for managing those aging effects are compared to the programs invoked in the plant evaluation. If, using good engineering judgment, it could be reasonably concluded that the plant evaluation is in agreement with the GALL evaluation a line item was considered consistent with NUREG-1801. There are cases where components and component material/environment combinations and aging effects are common between a NUREG-1801 line item and the plant evaluation but the aging management program selections differ. In those cases the discussion column will indicate the plant aging management program selection but no conclusion will be made that the line item is consistent with the GALL. Table 3.2-2 contains the Reactor Coolant System components aging management review results that are not addressed in NUREG-1801. A plant component is considered not addressed by the NUREG if the component type is not evaluated in the GALL or has a different material of construction or operating environment than evaluated in the GALL. This table includes the component types, materials, environments, aging effects requiring management, the programs and activities for managing aging, and a discussion column. To avoid confusion, no attempt was made to interrelate material/environment/aging effects from one NUREG-1801 chapter to another. Note that these tables only include those components, materials and environments that are applicable to a PWR.

Materials

The materials of construction of a component have a major influence on the evaluation of aging effects applicable to the component. Sources of information used to identify materials of construction include original equipment specifications, vendor technical manuals and drawings, fabrication drawings, piping line specifications, modification design records and field walkdowns/verifications. The tables below account for the materials of construction for the components requiring an aging management review. Since similar materials are susceptible to the same aging effects/mechanisms, the tables itemize the component types (i.e., groupings) while factoring in the materials of construction.

Environment

As previously described, the environment(s) to which components are exposed are critical in the determination of potential aging mechanisms and effects. A review of plant design documentation was performed to quantify the environmental conditions to which Ginna Station equipment is exposed. This review identified that some equipment is exposed to a variety of environments. This can include normal operating conditions and post accident conditions. Since aging mechanisms and effects will be primarily driven by the environmental conditions to which equipment is exposed on a daily basis, under normal operating conditions, these conditions will differ from the design parameters which are established based upon the worst case scenario (e.g., LOCA conditions). Ginna Station equipment environments may be categorized into basic external and internal environments detailed in Section 3.1.2.

Aging Effects Requiring Management

After the components requiring aging management review were identified and grouped by materials of construction and environment, a review of industry and plant-specific operating experience was performed. The purpose of this review was to assure that all applicable aging effects were identified, and to evaluate the effectiveness of existing aging management programs.

This experience review was performed utilizing various industry and plant-specific programs and databases. Industry operating experience sources included NRC Generic Publications (including Information Notices, Circulars, Bulletins, and Generic Letters), INPO Significant Operating Event Reports (SOER), EPRI Technical Reports, and other information sources, such as the B&W Owners Group Non-Class 1 Mechanical Tools Implementation document, Westinghouse Generic Technical Reports (GTRs), and the Generic Aging Lessons Learned (GALL) report.

Plant specific operating experience sources included Semi-annual and Annual Reports to AEC/NRC, Abnormal Occurrence and Licensee Event Reports (LERs), Non-Conformance Reports (NCRs), Corrective Action Reports (CARs), Refueling, Inspection and Overhaul Reports (RIOs), Inservice Inspection (ISI) Reports, Identified Deficiency Reports (IDRs), and ACTION Reports (ARs) from 1969 to the present. Information from these sources was compiled in various databases. Based upon the material of construction, the applicable environments, and operating experience the potential aging effects requiring management for each of the components was identified as documented in the tables below.

Time-Limited Aging Analysis

In addition to those identified in NUREG-1801, any additional time-limited aging analyses (TLAA) identified as appropriate to the system are identified in Section 4.0.

Confirmation of Topical Report Applicability

Class 1 Piping and Associated Pressure Boundary Components

The Westinghouse Owners' Group Life Cycle Management & License Renewal Program has prepared topical report, WCAP-14575-A, Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components (Reference 1), which has been utilized in the aging management review of the Ginna Class 1 piping and associated pressure boundary components. The scope of the RC components described in the topical report bounds the Ginna Class 1 piping and associated pressure boundary components. A reconciliation of the final SER for WCAP 14575-A applicant action items is provided in Table 3.2.0-1.

Reactor Internals

The Westinghouse Owners' Group Life Cycle Management & License Renewal Program has prepared topical report, WCAP-14577, Rev. 1-A, License Renewal Evaluation: Aging Management for Reactor Internals (Reference 2), which has been utilized in the aging management review of the Ginna Reactor Vessel Internals components. The scope of the Reactor Vessel Internals components described in the topical report bounds the Ginna Reactor Vessel Internals components. A reconciliation of the final SER for WCAP-14577, Rev. 1-A applicant action items is provided in Table 3.2.0-2.

Pressurizer

The Westinghouse Owners' Group Life Cycle Management & License Renewal Program has prepared topical report, WCAP-14574-A, License Renewal Evaluation: Aging Management Evaluation for Pressurizers (Reference 3), which has been utilized in the aging management review of the Ginna Pressurizer components. The Ginna pressurizer is included in WCAP-14574 -A. The scope of the Pressurizer components described in the topical report bounds the Ginna Pressurizer components with the following clarifications:

- For the Ginna pressurizer, the design, fabrication, and installed configuration are the same as specified in the WCAP with the exception of the earthquake lugs and valve support brackets.
- The WCAP identifies stress corrosion cracking (SCC) of the pressurizer sensitized stainless steel nozzle safe ends as a potential aging mechanism. However, the WCAP recognizes that service experience with nozzles and safe ends in Westinghouse pressurizers has been excellent and bases the need for aging management on general industry concerns. The WCAP identifies ASME Section XI inspections as the program to manage SCC of the safe ends. Consistent with the other Class 1 AMRs, SCC of stainless steel materials in the RCS environment can be effectively managed by the Ginna Station Water Chemistry Control Program. Cracking due to flaw growth is considered in the Ginna Pressurizer AMR and the Ginna Station ASME Section XI Inservice Inspection is credited to manage the aging effects. As such, ASME Section XI inspections remain as an aging management program for pressurizer safe-ends.

A reconciliation of the final SER for WCAP-14574 -A applicant action items is provided in Table 3.2.0-3.

Conclusion

The programs and activities selected to manage the aging effects of the Reactor Coolant System are identified in Table 3.2-1 and Table 3.2-2. The results of the applicant action item reviews are also contained in these tables, but in the SRP format. A description of these aging management activities 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 system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(1) The license renewal applicant is to verify that its plant is bounded by the topical report. Further, the renewal applicant is to commit to programs described as necessary in the topical report to manage the effects of aging during the period of extended operation on the functionality of the reactor coolant system piping. Applicants for license renewal will be responsible for describing any such commitments and identifying how such commitments will be controlled. Any deviations from the aging management programs within this topical report described as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the reactor coolant system piping and associated pressure boundary components or other information presented in the report, such as materials of construction, will have to be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).	The Ginna Station Class 1 piping and reactor coolant pumps are bounded by the topical report with regard to design criteria and features, materials of construction, fabrication techniques, installed configuration, modes of operation and environments/exposures. Aging management programs necessary to manage the effects of aging are consistent with those described in the topical report. Program commitments to manage the effects of aging for Class 1 piping and reactor coolant pumps are described in Appendix B of the License Renewal Application and include the following: • One-Time Inspection Program for Small-Bore Class 1 Piping • Water Chemistry Control Program • ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program • Boric Acid Corrosion Program.
(2) Summary description of the programs and evaluation of Time-Limited Aging Analyses are to be provided in the license renewal FSAR supplement in accordance with 10 CFR 54.21(d).	A summary of the programs identified to manage the effects of aging for Class 1 piping and reactor coolant pumps will be included in the UFSAR. A markup of the UFSAR sections affected by the TLAA evaluations will also be included in the UFSAR revision.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(3) The renewal applicant should complete the updated review of generic communications and capture any additional items not identified by the original review.	The entire set of NRC Generic Communications was reviewed using an automated text search routine developed for WOG. Initial searches were made for the occurrence of terms relating to components within the scope of WCAP-14575-A. Then, the titles of all selected documents were reviewed to eliminate those which did not relate to age-related degradation or which related to equipment not included in WCAP-14575-A. The remaining documents were individually reviewed to determine the applicable aging effect(s). These resulting documents are included in the summary provided in Table 3-1 in WCAP-14575-A An updated review of industry operating experience has been conducted independently by RG&E in support of license renewal activities. This review has included NRC Generic Communications through December 2001.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(4) The license renewal applicant must provide a description of all insulation used on austenitic stainless steel NSSS piping to ensure the piping is not susceptible to stress-corrosion cracking from halogens.	During construction, the Class 1 piping was insulated in accordance with the applicable Westinghouse Equipment Specification. As described in the Ginna Station UFSAR Section 5.2.3.2, "All external insulation of the reactor coolant system components is compatible with the component materials. All other external corrosion resistant surfaces in the reactor coolant system are insulated with a low or halide-free insulating material." Generally, the piping is insulated with a calcium carbonate material covered with a stainless steel sheet covering. Blanket insulation made from a halide-free fabric is also used at locations where periodic inspections and maintenance are required. The Reactor Coolant Pump casings and the SG Channel Heads are insulated with a stainless steel reflective insulation. Since the insulation that is used on the reactor coolant piping is low halide or halide free, the piping is not susceptible to stress corrosion cracking initiated by such halides.
(5) The license renewal applicant should describe how each plant-specific AMP addresses the following 10 elements: (1) scope of the program, (2) preventive actions, (3) parameters monitored or inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.	Programs necessary to manage the effects of aging for Class 1 piping and reactor coolant pumps address the 10 elements identified. These programs (including the 10 elements) are described in Appendix B of the License Renewal Application.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(6) The license renewal applicant should perform additional inspection of small-bore Reactor Coolant System piping, that is, less than 4-inch-size piping, for license renewal to provide assurance that potential cracking of small-bore Reactor Coolant System piping is adequately managed during the period of extended operation.	A sample of small-bore (< 4-inch NPS) piping welds will be inspected by a volumetric technique prior to the end of the current licensing period. The sample population will be selected on the basis of piping geometry, size, and flow condition. The aging management review and specific program commitments for Class 1 small-bore piping are addressed in Appendix B of the License Renewal Application.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(7) Components that have delta ferrite levels below the susceptibility screening criteria have adequate fracture toughness and do not require supplemental inspection. As a result of thermal embrittlement, components that have delta ferrite levels exceeding the screening criterion may not have adequate fracture toughness and do require additional evaluation or examination. The license renewal applicant should address thermal-aging issues in accordance with the staff's comments in Section 3.3.3 of this evaluation.	Reduction in fracture toughness for CASS Class 1 piping components and reactor coolant pump casings due to thermal aging embrittlement is addressed by Leak-Before-Break (LBB) analyses. These analyses are identified as TLAAs and are discussed in Section 4.0 of the License Renewal Application. The LBB (fracture mechanics) analyses demonstrate that significant margin exists between detectable flaw sizes and unstable flaws assuming "fully-aged" CASS properties. The Ginna Station methodology is consistent with the staff comments. The following clarification is also provided: The WOG approach to the potential for reduced fracture toughness in CASS components in WCAP-14575-A does not rely on susceptibility screening using delta ferrite; it conservatively assumes that all CASS Class 1 RCS components are potentially susceptible. The WOG report specifies an accepted analytical technique (Leak-Before-Break analysis) as the primary aging management approach to demonstrate adequate fracture toughness at end-of-life. Only if this approach fails are alternative "corrective" actions specified: repair, replacement, or the ASME Section XI inservice examination and flaw evaluation approach. (NOTE: Open item #6 deals with clarifications of these corrective actions.) The staff's comments in Section 3.3.3 of the DSER for valve bodies / pump casings state that existing ASME Section XI inspection requirements are adequate, with the alternative being ASME Code Case N-481 for pump casings. The WOG report specifies demonstration of compliance with the N-481 requirements as the primary aging

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(7) (continued)	management approach, with the supplemental visual inspections. If this approach fails, then ASME Section XI volumetric ISI is specified as the alternative. For both LBB and N-481, the WOG report clarifies that "fully-aged" fracture toughness data must be used for the limiting materials for the extended period of operation.
(8) The license renewal applicant should perform additional fatigue evaluations or propose an AMP to address the components labeled I-M and I-RA in Tables 3-2 through 3-16 of WCAP-14575.	An automated cycle counting and Fatigue Monitoring Program (FatiguePro^{TM}) has been implemented at Ginna Station. A review has been conducted of fatigue-sensitive locations in Class 1 piping systems, including components labeled I-M and I-RA in Tables 3-2 through 3-16 of WCAP-14575-A. Locations with highest predicted fatigue usage have been selected for monitoring. These include the surge line, charging nozzle, safety injection nozzle, and RHR tee. Locations subjected to severe thermal transients or fluctuations due to stratification are monitored using a stress-based fatigue methodology. A discussion of the fatigue-monitoring methodology is included in Section 4.0 of the License Renewal Application.

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(9) The staff recommendation for the closure of GSI-190 "Fatigue Evaluation of Metal Components for 60-Year Plant Life" is contained in a December 26, 1999, memorandum from Ashok Thadani to William Travers. The license renewal applicant should address the effects of the coolant environment on component fatigue life as aging management programs are formulated in support of license renewal. The evaluation of a sample of components with high-fatigue usage factors using the latest available environmental fatigue data is an acceptable method to address the effects of the coolant environment on component fatigue life.	Transient cycle projections to 60 years of plant operation have been made using both a conservative linear cycle projection and a more realistic weighted projection, which assumes that the more recent plant operating history is more representative of future operation than earlier plant history. This assessment of the frequency and severity of actual plant transients demonstrates that there is sufficient conservatism in the original design basis transient set, based on either method of projection (linear or weighted), to adequately bound the period of extended operation. However, a sample of Class 1 piping components with potentially high fatigue usage factors has been selected for monitoring using the FatiguePro™ Automated Cycle-Counting and Fatigue Monitoring Program. Fatigue usage for these locations will be computed by cycle-based or stress-based software modules including the latest available environmental factors. For components with CUFs which are expected to exceed 1.0 during the period of extended operation, corrective actions will include one or more of the following options: • Perform an explicit fatigue analysis (i.e., using sophisticated methods in ASME Section III NB-3200 or NB-3600) including environmental factors to lower the CUF below 1.0 prior to the end of the current license period, or • Repair of the fatigue-sensitive location(s), or • Replacement of the fatigue-sensitive location(s), or • Manage the effects of fatigue by an inspection program that has been reviewed and approved by the NRC (i.e., periodic non-destructive examination of the fatigue-sensitive locations at inspection intervals to be determined by a method accepted by the NRC).

Table 3.2.0-1 Class 1 Piping and Associated Pressure Boundary Components - WCAP-14575-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(9) (continued)	A further discussion of the Metal Fatigue TLAA is presented in Section 4.3 of the License Renewal Application.
(10) The license renewal applicant should revise AMP-3.6 to include an assessment of the margin on loads in conformance with the staff guidance provided in Reference 11. In addition, AMP-3.6 should be revised to indicate If the CASS component is repaired or replaced per ASME Code, Section XI IWB4000 or IWB7000, a new LBB analysis based on the material properties of the repaired or replaced component (and accounting for its thermal aging through the period of extended operation, as appropriate), is required to confirm the applicability of LBB. The inservice examination/flaw evaluation option is, per the basis on which the NRC staff has approved LBB in the past, insufficient to reestablish LBB approval.	An LBB analysis has been performed in accordance with NUREG-1061, for the Ginna reactor coolant loop piping applicable to the extended period of operation. The analysis considered loading, pipe geometry and fracture toughness (including the reduction in fracture toughness of CASS components in the RCS, i.e., elbows and RCP casings, due to thermal aging) to assess crack stability in the reactor coolant piping for the period of extended operation. The results demonstrated that significant margin exists between detectable flaw sizes and unstable flaws. Additionally, fatigue crack growth rates including environmental effects were evaluated for primary loop piping materials and shown to be insignificant. The Ginna Station Inservice Inspection Program requires that any repair or replacement of CASS components be performed in accordance with the requirements of ASME Section XI. This would include a new LBB analysis based on the material properties of the repaired or replaced component (and accounting for thermal aging through the period of extended operation).

Table 3.2.0-2 Reactor Internals - WCAP-14577, Rev. 1-A, Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(1) To ensure applicability of the results and conclusions of WCAP-14577 to the applicant's plant(s), the license renewal applicant is to verify that the critical parameters for the plant are bounded by the topical report. Further, the renewal applicant must commit to programs described as necessary in the topical report to manage the effects of aging during the period of extended operation on the functionality of the reactor vessel components. Applicants for license renewal will be responsible for describing any such commitments and proposing the appropriate regulatory controls. Any deviations from the aging management programs described in this topical report as necessary to manage the effects of aging during the period of extended operation and to maintain the functionality of the reactor vessel internal components or other information presented in the report, such as materials of construction, must be identified by the renewal applicant and evaluated on a plant-specific basis in accordance with 10 CFR 54.21(a)(3) and (c)(1).	The Ginna Station reactor vessel internals are bounded by WCAP-14577 Rev. 1-A with respect to design criteria and features, materials of construction, fabrication techniques, installed configuration, mode of operation and environments/ exposures. Programs necessary to manage the effects of aging are identified in Table 3.2-1 and Table 3.2-2 and summarized in Appendix B of the Application.
(2) A summary description of the programs and activities for managing the effects of aging and the evaluation of TLAAs must be provided in the license renewal FSAR supplement in accordance with 10 CFR 54.21(d).	Programs necessary to manage the effects of aging for the Ginna reactor vessel internals are the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program, the Reactor Vessel Internals Program, and the Water Chemistry Control Program. Summary descriptions of these programs are provided in Appendix A and Appendix B of the LRA. The only TLAA applicable to the Ginna reactor internals is fatigue. The TLAA for metal fatigue is evaluated in Section 4.3 of the LRA.
(3) For the holddown spring, applicants for license renewal are expected to address intended function, aging management review, and appropriate aging management program(s).	The holddown spring is within the scope of license renewal for the Ginna reactor vessel internals. The intended function, results of the aging management review, and aging management program for the holddown spring are provided in Table 2.3.1-3, Table 3.2-1, Table 3.2-2 and Appendix B of the LRA.

Table 3.2.0-2 Reactor Internals - WCAP-14577, Rev. 1-A, Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(4) The license renewal applicant must address aging management review, and appropriate aging management program(s), for guide tube support pins	In Section 2.6.7.2 of the GTR, it is stated, "As noted above, pin degradation does not lead to a loss of intended function. Generally, pin replacement is considered to be a sound maintenance practice to preclude degradation when industry experience indicates that such degradation has been observed." All 33 guide tube support pins were replaced at Ginna Station during the 1986 Refueling outage. The new pins were fabricated using a Framatome design which had been installed in French nuclear reactors where SCC pin failures had occurred. The original design of the support pin was susceptible to SCC due to an undesirable microstructure caused by solution heat treatment of the pins at a temperature less than 1800°F, followed by age-hardening and application of high preload, resulting in high tensile stresses. The replacement pins were solution heat-treated at 2000°F, followed by age-hardening at 1300°F. Other improvements in machined configuration and surface finish were incorporated in the new design. Final installation torque was reduced to achieve adequate cold preload and still maintain a tight joint. No evidence of cracking of the redesigned guide tube support pins has since been observed at Ginna. The effects of SCC on reactor internals guide tube support pins fabricated from Alloy X-750 with the updated pin designs may therefore be considered insignificant (GTR 3.1.2.2). However, loss of material due to wear is also identified as an aging effect requiring management for the support pins. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program (Subsection IWB) is credited with managing loss of material due to wear for the support pins.

Table 3.2.0-2 Reactor Internals - WCAP-14577, Rev. 1-A, Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(5) The license renewal applicant must explicitly identify the materials of fabrication of each of the components within the scope of the topical report. The applicable aging effect should be reviewed for each component based on the materials of fabrication and the environment.	The materials of fabrication were explicitly identified for all subcomponents of the Ginna reactor vessel internals within the scope of license renewal. The list of these materials and source documents are available for review on site. The aging effect evaluations are performed based on these materials and the appropriate environment.
(6) The license renewal applicant must describe its aging management plans for loss of fracture toughness in cast austenitic stainless steel RVI components, considering the synergistic effects of thermal aging and neutron irradiation embrittlement in reducing the fracture toughness of these components.	There are no reactor vessel internals components at Ginna Station within the scope of license renewal which are fabricated from cast austenitic stainless steel.

Table 3.2.0-2 Reactor Internals - WCAP-14577, Rev. 1-A, Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(7) The license renewal applicant must describe its aging management plans for void swelling during the license renewal period.	Recent studies of irradiation-induced swelling and stress relaxation suggest that swelling problems, if they arise in PWR core internals, would be highly localized, occurring in the higher flux and temperature locations. Irradiation-enhanced stress relaxation (or irradiation creep) refers to the accumulation of deformation strain over an extended time period, typically at elevated temperatures. Stress relaxation may mitigate loads resulting from void swelling. TEM studies of thin foils prepared from an intact baffle/former bolt and locking device removed from the Ginna reactor vessel internals in 1999 indicate that voids were present in the threaded end of the bolt but not in the head or the 304 SS locking device. The void volume, 0.004% maximum observed in the 347 SS bolt material, is small and preliminary extrapolation to the end of extended life using a simple square law suggests that void swelling should not be a concern. Ginna Station is participating in industry initiatives to determine the extent of the concerns associated with void swelling and what appropriate changes to the Reactor Vessel Internals Program may be required once an industry position has been established.
(8) Applicants for license renewal must describe how each plant-specific AMP addresses the following elements: (1) scope of the program, (2) preventative actions, (3) parameters monitored or inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.	The programs necessary to manage the effects of aging for the Ginna reactor vessel internals (RVIs) address the 10 elements identified. These elements are described in Appendix B of the LRA.

Table 3.2.0-2 Reactor Internals - WCAP-14577, Rev. 1-A, Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(9) The license renewal applicant must address plant-specific plans for management of cracking (and loss of fracture toughness) of RVI components, including any plans for augmented inspection activities.	The Ginna Station Reactor Vessel Internals Program is credited for managing cracking and loss of fracture toughness of RVI components. This program is described in Appendix B of the LRA and includes participation in industry initiatives and efforts for development of appropriate enhanced inspection techniques to permit detection and characterizing very small features of interest.
(10) The license renewal applicant must address plant-specific plans for management of age-related degradation of baffle/former and barrel/former bolting, including any plans for augmented inspection activities.	During the 1999 refueling outage, the entire population of 728 Type 347 stainless steel baffle/former bolts were selected for inspection by UT at Ginna Station. Of this number, only 639 bolts could actually be inspected due to limitations on accessibility. A total of 56 bolts were replaced with Type 316 stainless steel bolts during the outage. These were bolts that were found to contain defect-like indications and were part of a pre-qualified minimum bolt pattern for two-loop nuclear plants that was generated by the Westinghouse Owners Group (WCAP-15036). Maintaining the structural integrity of the bolts within this pattern assures compliance with requirements of ASME III, Subsection NG (1989), considering dynamic loads generated by a 10" line break in the reactor coolant system. This LOCA load bounds those that are generated by effects of earthquake, thermal, deadweight, and flow-induced vibration. No further inspections of baffle/former or barrel/former bolts are planned at Ginna Station. However, RG&E will continue to monitor and participate in industry initiatives with regard to baffle/former and barrel/former bolt cracking.
(11) The license renewal applicant must address the TLAA of fatigue on a plant-specific basis	A discussion of fatigue of reactor vessel internals is presented in Section 4.3 of the LRA.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(1) **3.3.1.1–1** - License renewal applicants should identify the TLAAs for the pressurizer components, define the associated CUF and, in accordance with 10 CFR 54.21(c)(1), demonstrate that the TLAAs meet the CLB fatigue design criterion, CUF $\leq$1.0, for the extended period of operation, including the insurge/outsurge and other transient loads not included in the CLB which are appropriate to such an extended TLAA, as described in the WOG report "Mitigation and Evaluation of Thermal Transients Caused by Insurges and Outsurges," MUHP–5060/5061/5062, and considering the effects of the coolant environment on critical fatigue location. The applicant must describe the methodology used for evaluating insurge/outsurge and other off-normal and additional transients in the fatigue TLAAs.	The only TLAA identified for the Ginna pressurizer is thermal fatigue. Transient cycle projections to 60 years of plant operation have been made using both a conservative linear cycle projection and a more realistic weighted projection, which assumes that the more recent plant operating history is more representative of future operation than earlier plant history. This assessment of the frequency and severity of actual plant transients demonstrates that there is sufficient conservatism in the original design basis transient set, based on either method of projection (linear or weighted), to adequately bound the period of extended operation. However, in order to address insurge/outsurge transients and thermal stratification, an automated cycle counting and Fatigue Monitoring Program (FatiguePro™) has been implemented at Ginna Station. Four fatigue-sensitive pressurizer locations (spray nozzle, surge nozzle, upper shell, and heater well penetration) have been selected for fatigue monitoring using a stress-based method which computes real-time fatigue usage based on actual plant transient data. These locations will be monitored for a sufficient period of time to establish a baseline cyclic history and cumulative fatigue usage. The effects of coolant environment are included in this computation. For locations with CUFs which are expected to exceed 1.0 during the period of extended operation, corrective actions will include one or more of the following options: • Perform an explicit fatigue analysis (i.e., using sophisticated methods in ASME Section III NB-3200 or NB-3600) including environmental factors to lower the CUF below 1.0 prior to the end of the current license period, or • Repair of the fatigue-sensitive location(s), or • Replacement of the fatigue-sensitive location(s), or

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(1) (continued)	• Manage the effects of fatigue by an inspection program that has been reviewed and approved by the NRC (i.e., periodic non-destructive examination of the fatigue-sensitive locations at inspection intervals to be determined by a method accepted by the NRC).
(2) **3.2.2.1–1 -** In the report, WOG concluded that general corrosion is nonsignificant for the internal surfaces of Westinghouse-designed pressurizers and that no further evaluations of general corrosion are necessary. While the staff concurs that hydrogen overpressure can mitigate the aggressive corrosive effect of oxygen in creviced geometries on the internal pressurizer surfaces, applicants for license renewal will have to provide a basis (statement) in their plant-specific applications about how their water chemistry control programs will provide for a sufficient level of hydrogen overpressure to manage crevice corrosion of the internal surfaces of their pressurizer.	Hydrogen concentration in the reactor coolant system (RCS) primary water at Ginna Station is strictly maintained within specified limits (25 to 50 cc/kg) by measurement of hydrogen concentrations in periodic RCS samples, and adjusting hydrogen overpressure in the volume control tanks accordingly. The hydrogen concentration limits established for the RCS ensure that general corrosion is non-significant for the internal surfaces of the Ginna pressurizer as well as other Class 1 components. Hydrogen concentration limits for the RCS are delineated in the Ginna Station Water Chemistry Control Program described in Appendix B of the License Renewal Application.
(3) **3.2.2.1-2 -** The staff finds that the criteria in GL 88–05 and the Section XI requirements for conducting system leak tests and VT–2 type visual examinations of the pressurizer pressure boundary are acceptable programs for managing boric acid corrosion of the external, ferritic surfaces and components of the pressurizer. However, the report fails to refer to the actual provisions in the ASME Code, Section XI that require mandatory system leak tests of the pressurizer boundary. The applicants must identify the appropriate Code inspection requirements from ASME Code Table IWB-2500-1.	Leak testing of the Ginna pressurizer is required by ASME Section XI, Subsection IWB, Table IWB-2500-1, Category B-P.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(4) **3.2.2.3.2–1** - The staff concurs that the potential to develop SCC in the bolting materials will be minimized if the yield strength of the material is held to less than 150 ksi, or the hardness is less than 32 on the Rockwell C hardness scale; however, the staff concludes that conformance with the minimum yield strength criteria in ASME Specification SA–193 Grade B7 does not in itself preclude a quenched and tempered low-alloy steel from developing SCC, especially if the acceptable yield strength is greater than 150 ksi. To take credit for the criteria in EPRI Report NP–5769, the applicant needs to state that the acceptable yield strengths for the quenched and tempered low-alloy steel bolting materials (e.g., SA–193, Grade B7 materials) are in the range of 105–150 ksi.	Although there have been a few reported cases of cracking of bolting in the industry caused by SCC, these have been attributed to susceptible high yield stress materials exposed to aggressive environments, such as lubricants containing molybdenum disulfide. However, a survey of industry experience, technical literature, and laboratory corrosion studies (documented in EPRI Report NP-5769) indicates that SCC should not be a concern for closure bolting in nuclear power plant applications if the specified minimum yield strength is <150 Ksi. For quenched and tempered low-alloy steels typically used for closure bolting (e.g., SA193, Grade B7), susceptibility to SCC is controlled by yield strength. The minimum yield strength specified in SA193 for Grade B7 material is 105 Ksi, which is well below the threshold value of 150 Ksi identified in EPRI Report NP-5769. Furthermore, the selection and use of fastener lubricants for pressure boundary components has been controlled by the Ginna Station Quality Assurance Program since 1983 as part of the response to IE Bulletin 82-02. Limits are also imposed on levels of contaminants such as chlorides and sulfur compounds (including molybdenum disulfide) in lubricants and sealant compounds. Therefore, it is reasonable to conclude that failure by SCC should not be a significant issue for SA193 Grade B7 bolting materials. Ginna Station operating experience supports this conclusion. Therefore, cracking due to SCC is not considered to be an aging effect requiring management for the Ginna pressurizer bolting.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(5) **3.2.5-1 -** The staff considers the discussion in Section 3.5.2 to be extremely confusing in that it appears WOG is making three different conclusions that conflict with one another: a. That fluid flow velocity and particulate conditions are not sufficient in the pressurizer to consider that erosion is a plausible degradation mechanism that could affect the integrity of the subcomponents in the pressurizer. b. That seven components in the pressurizer (refer to the list above) are exposed to fluid flows that have the potential to result in erosion of the components. c. That only one component in the pressurizer (the spray head) is exposed to a fluid flow that has the potential to result in erosion of the component. The applicant should state why erosion is not plausible for the surge nozzle thermal sleeve, spray nozzle thermal sleeve, surge nozzle safe-end, and spray nozzle safe-end. If erosion is plausible, then an AMP is required.	Based on the aging management review of the Ginna pressurizer, loss of material due to erosion is not an aging effect requiring management. Austenitic stainless steels are considered to be resistant to erosion in PWR operating environments. The austenitic stainless steel surge and spray nozzle thermal sleeves and safe ends, and the surge nozzle retaining baskets are not subject to flow rates that are sufficiently high to cause erosion. The spray head couplings and the spray heads do not perform license renewal intended functions and, thus, do not require an aging management review.
(6) **3.3–1 -** Applicants for license renewal must describe how each plant-specific AMP addresses the following 10 elements: (1) scope of the program, (2) preventive action, (3) parameters monitored or inspected, (4) detection of aging effects, (5) monitoring and trending, (6) acceptance criteria, (7) corrective actions, (8) confirmation process, (9) administrative controls, and (10) operating experience.	Programs necessary to manage the effects of aging for the Ginna pressurizer address the 10 elements identified. Detailed program descriptions (including the 10 elements) are provided in Appendix B of the License Renewal Application.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(7) **3.3.2.1–1 -** Applicants for license renewal must provide sufficient details in their LRAs about how their GL 88–05 programs and ISI programs will be sufficient to manage the corrosive effects of boric acid leakage on their pressurizer components during the proposed extended operating terms for their facilities, including postulated leakage from the pressurizer nozzles, pressurizer nozzle-to-vessel welds, pressurizer nozzle-to-safe end welds, and pressurizer manway bolting materials.	Loss of material due to boric acid wastage resulting from boric acid leakage is an aging effect requiring management affecting the external surfaces of the Ginna pressurizer, including bolting materials. The Ginna Station Boric Acid Corrosion Program and the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program are credited with managing this aging effect. Detailed program descriptions provided in Appendix B of the License Renewal Application demonstrate that the effects of aging due to boric acid leakage will be adequately managed during the period of extended operation.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(8) **3.3.2.2–1** - The staff concludes that an AMP is necessary to control and manage the potential for SCC to occur in welded pressurizer penetration nozzles and manway bolting materials, and recommends that a licensee could credit the following programs as the basis for managing the phenomena of PWSCC/IGSCC of the pressurizer components: (1) the primary coolant chemistry control program; (2) the ISI program for the pressurizers; and (3) the plant-specific quality assurance program as it pertains to assuring that previous welding activities on welds in the pressurizer have been controlled in accordance with the pertinent requirements of 10 CFR Part 50, Appendix B, and with the pertinent welding requirements of the ASME Code for Class 1 systems. The staff concludes that applicants need to extend AMP–2–1 to the pressurizer penetration nozzles, to the nozzle-to-vessel welds, and to the manway bolting materials, and to include the appropriate Code requirements among the program attributes listed in Table 4–1 and summarized in the text in Section 4.1 of the report. Applicants for license renewal must provide sufficient details in their LRAs as to how their primary coolant chemistry control programs, ISI programs, and 10 CFR Part 50, Appendix B, quality assurance programs will be sufficient to manage the potential for SCC to occur in the pressurizer nozzle components and bolted manway covers during the proposed extended operating terms for their facilities.	Stress corrosion cracking (SCC), as it applies to the pressurizers, is identified as an aging effect requiring management for pressurizer parts exposed to primary (treated) water. The Ginna Station Water Chemistry Control Program and the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program are credited for managing cracking due to SCC. The Quality Assurance Program applies to all aging management programs credited for license renewal. The program descriptions provided in Appendix B of the License Renewal Application demonstrate that these programs will adequately manage cracking due to SCC throughout the extended period of operation. As stated previously in the response to Applicant Action Item 3.2.2.3.2-1, cracking due to SCC is not an aging effect requiring management for pressurizer bolting.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(9) **3.3.2.2–2 -** Applicants must propose an AMP to verify whether or not thermal fatigue-induced cracking has propagated through the clad into the ferritic base metal or weld metal beneath the clad.	There is no industry experience to suggest that cracks initiating at the clad inner surfaces in the pressurizer will propagate into the underlying base metal or weld material. Observed flaws in other plants were monitored for an extended period of time, and no significant flaw growth was observed. In 1990, several indications were discovered at the Connecticut Yankee Plant. UT inspection confirmed that the indications did not penetrate into the ferritic base metal, and therefore, in accordance with ASME Section XI, the indications were acceptable without repair. A surveillance program was initiated, and after two follow-up inspections that showed no change, the surveillance program was discontinued with NRC approval. In several of the cases of observed cracking, fracture mechanics analyses were performed and demonstrated that the cladding indications would not compromise the integrity of the primary system components. At temperatures >180°F, the cladding has virtually no impact on fracture behavior. This is the low end of the plant operating range. ASME Section XI flaw evaluation rules require that the effects of cladding must be considered in any structural integrity evaluation, especially for postulated flaws that penetrate the cladding into the base metal. The actual impact of the cladding on such an evaluation is negligible. The pressurizer shell design considers fatigue usage throughout the operating lifetime and includes adequate margin. This is expected to preclude the formation of fatigue cracks in the cladding material. The fracture mechanics evaluations performed for actual observed cracks in other plants indicate that the cracks do not grow significantly over the plant lifetime. Therefore, a specific aging management program to manage fatigue cracking of the pressurizer cladding is not required.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(9) (continued)	Cracking due to fatigue is identified as a Time-Limited Aging Analysis for the Ginna pressurizer, and is analytically addressed in this TLAA. The conclusion of this analysis is that adequate margin exists in the original design-basis transient set to envelope the period of extended operation. However, a Fatigue Monitoring Program has been implemented as a confirmatory program to ensure that the fatigue analysis remains valid for the license renewal term. Cracking due to flaw growth and stress corrosion is an aging effect requiring management. As noted above, programs credited to manage cracking of pressurizer parts include the Water Chemistry Control Program and the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program, both of which are described in Appendix B of the License Renewal Application. Based on the aging management review performed for the Ginna pressurizer, no additional aging management program is required.

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(10) **3.3.2.2–3 -** The staff is concerned that IGSCC in the heat- affected zones of 304 stainless steel supports that are welded to the pressurizer cladding could grow as a result of thermal fatigue into the adjacent pressure boundary during the license renewal term. The staff considers that these welds will not require aging management in the extended operating periods if applicants can provide a reasonable justification that sensitization has not occurred in these welds during the fabrication of these components. Therefore, applicants for license renewal must provide a discussion of how the implementation of their plant-specific procedures and quality assurance requirements, if any, for the welding and testing of these austenitic stainless steel components provides reasonable assurance that sensitization has not occurred in these welds and their associated heat-affected zones. In addition, the staff requests that applicants for license renewal identify whether these welds fall into Item B8.20 of Section XI Examination Category B–H, Integral Attachments for Vessels, and if applicable, whether the applicants have performed the mandatory volumetric or surface examinations of these welds during the ISI intervals referenced in the examination category.	Both the cladding material (308L) used to protect the pressurizer alloy steel shell from primary water, and the weld material (309L) used to join the pressurizer internal supports and the pressurizer cladding were selected to have sufficiently low carbon content to minimize the likelihood of sensitization in these welds.The low carbon (and nitrogen) content of the 304 stainless steel material in the heater support plates and the surge nozzle retaining basket minimize the susceptibility of the material to sensitization as a result of welding. However, in spite of material selection and manufacturing processes which minimize sensitization, the possibility cannot be precluded that sensitized areas exist in the 304 stainless steel supports or their welds. The same Water Chemistry Control Program which precludes SCC in other PWR primary system materials is also effective in preventing SCC in these pressurizer components and welds. Rigorous control of oxygen and chlorides provides an essentially benign environment which has been shown to be effective both in laboratory experiments and years of operating experience. Therefore, the presence of sensitized stainless steel material does not necessarily result in any increase in susceptibility to IGSCC. Note that even in laboratory cases where severely sensitized stainless steels have been deliberately exposed to PWR environments, no intergranular attack has been observed. In summary, the Ginna Station Water Chemistry Control Program is an adequate aging management program to preclude SCC in the pressurizer internal attachment welds for the period of extended operation for the following reasons:

Table 3.2.0-3 Pressurizers - WCAP-14574-A Final Safety Evaluation Report Response to Applicant Action Items

Renewal Applicant Action Item	Plant-Specific Response
(10) (continued)	1. It is possible that some locations of the welded stainless steel attachments in the pressurizer are sensitized, even with the use of 308L weld material and careful control of the welding processes; 2. Studies and operating experience have shown that PWR environments do not lead to stress corrosion cracking in sensitized stainless steel; 3. Service experience has demonstrated that stress corrosion cracking does not occur in stainless steels in a PWR environment, whether or not they are sensitized. In response to the question regarding the applicability of Item B8.20 of Examination Category B-H, this category applies to exterior attachments such as the support skirt, seismic lug and support bracket, and is not applicable to the interior attachment welds.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(1) Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. Cumulative fatigue damage was identified as an aging effect requiring management during the period of extended operation for components listed in this component grouping. Thermal fatigue is addressed as a TLAA in Section 4.3 for those components which contain time-limited assumptions defined by the current operating term and incorporated into the current licensing basis. Secondary-side steam generator pressure boundary components such as the top head, steam nozzle, upper and lower shells, transition cone and feedwater nozzle/impingement plate are included in this grouping although they are not part of the reactor coolant pressure boundary.
(2) Steam generator shell assembly	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. Loss of material due to general, pitting and crevice corrosion of the steam generator shell assembly (including transition cone) are identified as an aging effect requiring management at Ginna Station. Loss of material from all applicable aging mechanisms on steam generator secondary-side internal surfaces is effectively managed by control of secondary-side water chemistry through the Water Chemistry Control Program and inservice inspections performed in accordance with the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program. In addition, the Ginna Station Steam Generator Tube Integrity Program which was developed in accordance with NEI Initiative 97-06 provides all-inclusive guidance for the management of steam generator assets. Assessment of secondary-side aging mechanisms is included in the scope of Steam Generator Tube Integrity Program.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(3) Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E>1 MeV)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	Yes, TLAA	Consistent with NUREG-1801. Loss of fracture toughness in ferritic reactor pressure vessel materials due to neutron irradiation embrittlement has been identified as an aging effect requiring management during the period of extended operation. Reactor pressure vessel TLAAs, including RT_{PTS}, adjusted reference temperature, and equivalent margins analysis are addressed in Section 4.2. This component group includes the vessel shell and nozzles.
(4) Reactor vessel beltline shell and welds	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Yes, plant specific	Consistent with NUREG-1801. Loss of fracture toughness in reactor vessel beltline shell and weld materials due to neutron irradiation embrittlement has been identified as an aging effect requiring management during the period of extended operation. The upper shell and nozzles are not subject to significant neutron irradiation exposure because of their physical distance from the reactor core. The limiting beltline material in the Ginna Station reactor vessel is the intermediate-to-lower shell beltline circumferential weld. The Ginna Station Reactor Vessel Surveillance Program, in conjunction with TLAA analyses, effectively manages loss of fracture toughness in the beltline materials. The Reactor Vessel Surveillance Program provides adequate material property and neutron dosimetry data to predict fracture toughness in beltline materials at the end of the period of extended operation. In addition, equivalent margins analyses have been performed in accordance with 10 CFR 50 Appendix G methods. These fracture mechanics analyses (see TLAAs, Section 4.2) provide assurance that beltline material toughness values in the Ginna Station reactor vessel will remain at acceptable levels through the period of extended operation.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(5) Westinghouse and B&W baffle/former bolts	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of fracture toughness due to neutron irradiation embrittlement was identified as an aging effect requiring management for the Ginna Station baffle/former bolts. A combination of the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program and the Reactor Vessel Internals Program (described in Appendix B) will be used to manage this aging effect. During the 1999 refueling outage, all accessible Type 347 stainless steel baffle/former bolts were inspected at Ginna Station and bolts with defect-like indications were replaced with Type 316 stainless steel bolts. The bolt inspection and replacement program assured the structural integrity of bolts within a pre-qualified minimum pattern generated by WOG and thereby assured compliance with ASME Section III, Subsection NB (1989). In addition, destructive metallurgical analysis of intact Type 347 bolts revealed only minor evidence of voids near the threaded end of one bolt, but not in the head end. The void volume (.004%) was small and preliminary extrapolations to the end of life suggest that void swelling should not be a concern. For this reason, change in dimensions due to void swelling is not expected to represent a concern for baffle/former bolts in the Ginna Station reactor vessel internals. These facts notwithstanding, Ginna Station will continue to participate in WOG activities and monitor industry initiatives for the purpose of evaluating the significance of void swelling on selected PWR reactor vessel internals components. As new information and technology becomes available, the plant-specific Reactor Vessel Internals Program will be modified to incorporate enhanced surveillance techniques

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(6) Small-bore reactor coolant system and connected systems piping	Crack initiation and growth due to SCC, intergranular SCC, and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	Yes, parameters monitored/ inspected and detection of aging effects are to be further evaluated	Consistent with NUREG-1801. Included and evaluated with this component grouping are Non-Class 1 RCS small-bore piping, tubing, valves, and other components in connected systems. Crack initiation and growth due to SCC was identified as an aging effect requiring management in small-bore (<NPS 4) reactor coolant system piping and branch lines. Aging management of service-induced cracking will be accomplished by a combination of the Water Chemistry Control Program and the One-Time Inspection Program (described in Appendix B). NUREG-1801 further identifies the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program as an applicable aging management program, but also notes that volumetric inspections are not required for piping < NPS 4. A sample of small-bore piping welds will be inspected using appropriate volumetric examination techniques near, but prior to, the end of the current license period. This sample will be selected to include various piping sizes, configurations and flow conditions. If a flaw is detected in the sample, the successive examinations described in ASME Code, Section XI, IWB-2420 and additional examinations as described in IWB-2430 would apply as appropriate. The proposed combination of water chemistry controls and volumetric inspections (implemented by the Water Chemistry Control Program and One-Time Inspection Program) is an effective means of managing service-induced cracking in small-bore reactor coolant system piping and connected branch lines during the period of extended operation.
(7) Vessel shell	Crack growth due to cyclic loading	TLAA	Yes, TLAA	Consistent with NUREG-1801. Underclad cracking in carbon/low-alloy steel which has been clad with austenitic stainless steel using weld-overlay processes has been identified as an aging effect requiring management and is addressed as a TLAA. An evaluation of the TLAA for underclad cracking is contained in Section 4.3.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(8) Reactor internals	Changes in dimension due to void swelling	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The specific concerns arising from the effects of void swelling in reactor internals are constriction of flow paths, interference with control rod insertion, and excessive baffle/former bolt loading. Recent destructive examinations of baffle/former bolts removed from the Ginna Station reactor internals suggest that void volumes are very small and changes in dimension in baffle/former bolts due to void swelling should not be a concern during the period of extended operation. In addition, recent studies of irradiation-induced swelling and stress relaxation suggest that swelling problems, if they arise in PWR core internals, would be highly localized, occurring in the higher flux and temperature locations. Irradiation-enhanced stress relaxation (or irradiation creep) may mitigate or limit loads resulting from void swelling. For many reactor internals components, change in dimension does not represent an aging effect requiring management because the intended function of the component(s) is not affected. Additional reactor internal components not identified in NUREG-1801 that are susceptible to changes in dimension due to void swelling are identified in Table 3.2-2 Line Number (7) These facts notwithstanding, the Reactor Vessel Internals Program manages changes in dimension due to void swelling. In addition to inservice inspections performed according to the requirements of ASME Section XI, Subsection IWB, the Reactor Vessel Internals Program provides for augmented visual (VT-1) inspections for certain susceptible (or limiting) components using high resolution techniques yet to be developed. Ginna Station will continue to participate in industry investigations of aging effects applicable to reactor vessel internals as well as initiatives to develop advanced inspection techniques which will permit resolution and measurement of very small features of interest. Ginna Station will incorporate applicable results of industry initiatives related to void swelling in the Reactor Vessel Internals Program.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(9) PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains	Crack initiation and growth due to SCC and/or primary water stress corrosion cracking (PWSCC)	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The reactor vessel leak detection line is fabricated from stainless steel. The portion of the line that is in scope to license renewal is included in the small-bore piping category. Management of service-induced cracking for small-bore piping is addressed in Item 6, and is consistent with NUREG-1801. The pressurizer spray head performs no license renewal intended functions at Ginna Station. The steam generator instrument nozzles are low-alloy steel, not Alloy 600, and therefore are not included in this component group. The core support pads and the bottom head instrument penetrations are fabricated from Alloy 600. Crack initiation and growth of the core support pads and the bottom head penetrations due to SCC/PWSCC is managed at Ginna Station by a combination of the Water Chemistry Control Program and the Reactor Vessel Head Penetration Inspection Program (described in Appendix B). The Reactor Vessel Head Penetration Inspection Program is a plant-specific program which includes participation in industry initiatives related to management of Alloy 600 penetration cracking issues.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(10) Cast austenitic stainless steel (CASS) reactor coolant system piping	Crack initiation and growth due to SCC	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The Ginna Station pressurizer surge line nozzle is cast carbon steel (integral with the pressurizer bottom head) and clad with weld-deposited austenitic stainless steel overlay. The reactor coolant system piping is forged Type 316 stainless steel. However, the fittings (elbows) are CASS (Type CF8M). In addition, the CASS (Type CF8M) reactor coolant pump casings are also included in this component grouping. As in NUREG-1801, crack initiation and growth due to SCC was identified as an aging effect requiring management for reactor coolant system CASS components. The Ginna Station Water Chemistry Control Program monitors and controls primary water chemistry in accordance with the guidelines of EPRI TR-105714 (Rev. 5) and therefore effectively manages crack initiation and growth due to SCC. Additionally, the flaw tolerance evaluations performed by fracture mechanics analysis under the Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Program (described in Appendix B) provide assurance that large margins exist for postulated flaw sizes which satisfy leakage detection criteria as compared to unstable flaw sizes.
(11) Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry	Yes, AMP for PWSCC of Inconel 182 weld is to be evaluated	There are no components fabricated from Alloy 600 in the Ginna Station pressurizer. Instrument penetrations, heater well tubes and adapters are wrought Type 316 stainless steel.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(12) Westinghouse and B&W baffle former bolts	Crack initiation and growth due to SCC and IASCC	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Crack initiation and growth due to SCC and IASCC were identified as aging effects requiring management for Ginna Station baffle/former bolts. A combination of the Water Chemistry Control Program, ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program and the Reactor Vessel Internals Program will be used to manage this aging effect. During the 1999 refueling outage, all accessible Type 347 stainless steel baffle/former bolts were inspected at Ginna Station and bolts with defect-like indications were replaced with Type 316 stainless steel bolts. The bolt inspection and replacement activities assured the structural integrity of bolts within a pre-qualified minimum pattern generated by WOG and thereby assured compliance with ASME Section III, Subsection NB (1989). No further inspections of baffle/former bolts are anticipated at Ginna Station. However, Ginna Station will continue to participate in WOG activities and monitor industry initiatives for the purpose of evaluating the significance of cracking due to IASCC on selected PWR reactor vessel internals components. As new information and technology becomes available, the plant-specific Reactor Vessel Internals Program (described in Appendix B) will be modified to incorporate enhanced surveillance techniques.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(13) Westinghouse and B&W baffle former bolts	Loss of preload due to stress relaxation	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Loss of mechanical closure integrity due to irradiation creep/stress relaxation was identified as an aging effect requiring management for Ginna Station baffle/former bolts. Irradiation-enhanced stress relaxation (or irradiation creep) refers to the accumulation of deformation strain over an extended time period, typically at elevated temperatures. Loss of preload due to stress relaxation will be managed jointly by the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program and the Reactor Vessel Internals Program. Ginna Station will continue to participate in industry investigations of aging effects applicable to reactor vessel internals as well as initiatives to develop advanced inspection techniques which will permit resolution and measurement of very small features of interest. Aging management activities or surveillance techniques resulting from these initiatives will be incorporated, as required, as enhancements to the Reactor Vessel Internals Program.
(14) Steam generator feedwater impingement plate and support	Loss of section thickness due to erosion	Plant specific	Yes, plant specific	This component group is not applicable to Ginna Station. The feedwater delivery to the steam generators at Ginna Station is through feedrings to Alloy 690 J-tubes. The feedrings and J-tubes perform no license renewal intended function.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(15) (Alloy 600) Steam generator tubes, repair sleeves, and plugs	Crack initiation and growth due to PWSCC, outside diameter stress corrosion cracking (ODSCC), and/or inter-granular attack (IGA) or loss of material due to wastage and pitting corrosion, and fretting and wear: or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry	Yes, effectiveness of a proposed AMP is to be evaluated	Consistent with NUREG-1801. Cracking due to PWSCC and IGA/IGSCC and loss of material due to pitting and wear were identified as aging effects requiring management for the Ginna Station steam generator tubes and plugs. These aging effects will be jointly managed by the Water Chemistry Control Program (both primary and secondary water chemistry) and the Steam Generator Tube Integrity Program (described in Appendix B). The Steam Generator Tube Integrity Program at Ginna Station was developed to meet the guidelines in NEI 97-06. Consistent with these guidelines, the requirements for SG degradation management are included in Section 3.4.13 of Ginna Station Technical Specifications. These requirements, including tube inspection scope and frequency, plugging, repair and leakage monitoring have been incorporated in plant administrative controls. New, replacement recirculating steam generators (SG) were installed at Ginna Station in 1996. These generators incorporate many enhancements in design and materials of construction. The tubes are fabricated from drawn Alloy 690 TT (thermally-treated) material. The tubes are hydraulically expanded over the full depth of the tubesheet. The tube support design is a lattice-grid structure fabricated from Type 410 stainless steel bars. Anti-vibration supports in the U-bend region of the bundle are also Type 410 stainless steel fan-bars. Sufficient corrosion of the tube support structure to cause tube-denting is not expected based on the resistance of Type 410 stainless steel to the secondary water environment. After four operating cycles (six years), no service-induced defects have been detected in the tubes and no repair plugs or sleeves have been installed other than two factory-installed Alloy 690 TT plugs in each generator. Secondary-side water chemistry control at Ginna Station is based on all-volatile-treatment (AVT), not phosphate treatment.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(16) Tube support lattice bars made of carbon steel	Loss of section thickness due to FAC	Plant specific	Yes, plant specific	Tube support lattice bars are fabricated from Type 410 stainless steel in Ginna Station replacement steam generators. Type 410 stainless steel is not susceptible to FAC. Therefore this component group is not applicable to Ginna Station. A discussion of steam generator components susceptible to FAC is given in Item 21.
(17) Carbon steel tube support plate	Ligament cracking due to corrosion	Plant specific	Yes, effectiveness of a proposed AMP is to be evaluated	There are no carbon steel tube support materials in the Ginna Station steam generators. Therefore this component group is not applicable to Ginna Station. NUREG-1801 does not specify the corrosion mechanisms which might cause ligament cracking. Cracking due to SCC and loss of material due to pitting and crevice corrosion were identified as aging effects requiring management for the lattice grid support bars in the Ginna Station steam generators. These aging effects are managed jointly by the Water Chemistry Control Program and the Steam Generator Tube Integrity Program, which provides for secondary side inspections to verify the effectiveness of water chemistry control. These aging management programs will be identified in Appendix B.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(18) Reactor vessel closure studs and stud assembly	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	No	Consistent with NUREG-1801. Crack initiation and growth due to SCC or IGSCC were not identified as an aging effect requiring management for the Ginna Station reactor vessel closure studs. Nevertheless, the Reactor Head Closure Studs Program which includes ASME Section XI visual, surface and volumetric inservice inspections capable of detecting cracking due to SCC, is credited for managing aging effects applicable to the reactor head closure studs. NUREG-1801 identifies crack initiation and growth due to SCC is a potential aging effect for reactor vessel closure studs exposed to borated water leaks. Although there have been a few reported cases of cracking of bolting in the industry caused by SCC, these have been attributed to susceptible high yield-stress materials exposed to aggressive environments, such as lubricants containing molybdenum disulfide. A survey of industry experience, technical literature, and laboratory corrosion studies (documented in EPRI Report NP-5769) indicates that SCC should not be a concern for closure bolting in nuclear power plant applications if the specified minimum yield strength is <150 Ksi. The Ginna Station studs are fabricated from SA-320 Gr. L43 material (corresponding to AISI Grade 4340) which is not a high strength steel. The minimum yield strength specified in SA-320 for Grade L43 material is 105 Ksi, which is well below the 150 Ksi threshold. Furthermore, the selection and use of fastener lubricants for pressure boundary components has been controlled by the Ginna Station Quality Assurance Program since 1983 as part of the response to IE Bulletin 82-02. Limits are also imposed on levels of contaminants such as chlorides and sulfur compounds in lubricants and sealant compounds. Therefore, it is reasonable to conclude that failure by SCC should not be a significant issue for SA-320 Gr. L43 bolting materials. Industry and plant-specific operating experience support this conclusion.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(19) CASS pump casing and valve body	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	No	Consistent with NUREG-1801. Loss of fracture toughness due to thermal aging embrittlement was identified as an aging effect requiring management for the CASS reactor coolant pump (RCP) casings and Class 1 valve bodies. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program (as modified by ASME Code Case N-481) is credited for managing this aging effect for the RCP casings. One of the requirements of Code Case N-481 is a flaw tolerance evaluation performed by fracture mechanics methods for the RCP casings to verify that adequate margin exists for flaw stability after consideration is given to reduction in fracture toughness due to thermal aging embrittlement. This evaluation has been performed and adequate margin was demonstrated throughout the period of extended operation. For Class 1 valve bodies, the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program is credited for managing loss of fracture toughness due to thermal aging embrittlement.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(20) CASS piping	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 is credited with managing loss of fracture toughness due to thermal aging embrittlement. This program invokes ASME Section XI ISI requirements as well as flaw-tolerance analyses using fracture mechanics methods which take into account the effects of thermal aging during the period of extended operation. An updated leak-before-break (LBB) analysis has been performed for the Ginna Station reactor coolant system piping and elbows based on loading, pipe geometry, and end-of-life fracture toughness considering thermal aging effects through the end of the period of extended operation. This analysis is addressed as a TLAA and is discussed in Section 4.0 of the Application. The CRDM pressure housings and all reactor coolant system nozzle safe ends at Ginna Station are wrought stainless steel, not CASS. The pressurizer spray head performs no license renewal intended function at Ginna Station. In addition, the pressurizer nozzle is cast carbon steel (integral with the pressurizer) and clad with austenitic stainless steel weld overlay. The reactor coolant system piping is forged Type 316 stainless steel. However, the fittings (elbows) are CASS (Type CF8M).
(21) BWR piping and fittings; steam generator components	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	Consistent with NUREG-1801. The aging management review for the replacement steam generators did not identify loss of material due to FAC as an aging effect requiring management for the steam outlet nozzle and feedwater inlet nozzle. The steam quality and flows at the steam outlet nozzle are such that FAC would not represent a concern. Furthermore, the design of the feedwater inlet nozzle includes an Alloy 690 thermal sleeve which is extremely resistant to flow-accelerated corrosion damage. Nevertheless, the Flow-Accelerated Corrosion Program is credited for verification that steam generator components are not degraded due to FAC.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(22) Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high pressure and high temperature systems	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	No	Consistent with NUREG-1801. The closure bolting for reactor coolant system valves, reactor coolant pump, steam generator, and pressurizer is SA-193 Grade B7 material, with specified minimum yield strength of 105 Ksi. Consequently, crack initiation and growth due to SCC is not an applicable aging effect (see discussion for Item 18). Loss of mechanical closure integrity due to boric acid corrosion was also identified as an aging effect requiring management for all RCPB bolting potentially exposed to borated water leaks. The applicable aging management program is the Boric Acid Corrosion Program. For all RCPB bolting other than the reactor vessel closure studs, loss of material due to wear and loss of mechanical closure integrity due to stress relaxation are managed at Ginna Station by the Bolting Integrity Program (described in Appendix B). The Bolting Integrity Program invokes the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program for assurance that effects of aging for RCPB closure bolting are effectively managed. There are no flanged connections associated with the CRDM penetrations with reactor coolant pressure boundary (RCPB) bolting at Ginna Station.
(23) CRD nozzle	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry	No	Consistent with NUREG-1801. Crack initiation and growth due to PWSCC was identified as an aging effect requiring management for the Alloy 600 CRDM nozzles and reactor head vent pipe. The aging management programs credited for managing this effect are the Water Chemistry Control Program and the Reactor Vessel Head Penetration Inspection Program.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(24) Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting)	Crack initiation and growth due to cyclic loading, and/or SCC, and PWSCC	Inservice inspection; water chemistry	No	Consistent with NUREG-1801. Crack initiation and growth due to SCC and flaw growth were identified as aging effects requiring management for the reactor vessel nozzle safe ends, CRD housing and RCS components. Aging management programs credited for managing these effects are the Water Chemistry Control Program and ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program. The pressurizer manway and flange are integrally cast with the carbon steel heads and are evaluated with the pressurizer heads. The pressurizer relief tank is not in scope to license renewal at Ginna Station. For small-bore connected systems piping and fittings, aging management programs for managing crack initiation and growth due to SCC are discussed in Item 6.
(25) Reactor vessel internals CASS components	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement	No	The upper and lower internals assemblies in the Ginna Station reactor vessel contain no CASS components. The lower support forging and lower support plate columns are wrought stainless steel. Therefore this component grouping is not applicable to Ginna Station.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(26) External surfaces of carbon steel components in reactor coolant system pressure boundary	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801. Loss of material due to boric acid corrosion was identified as an aging effect requiring management for external surfaces of carbon steel components (including closure bolting) in the reactor coolant system pressure boundary. The Boric Acid Corrosion Program is credited for managing this aging effect. Additionally, loss of material due to boric acid corrosion was identified for all borated water systems as well as non-borated water systems in proximity to borated water systems at Ginna Station. The Boric Acid Corrosion Program was also credited for aging management of boric acid corrosion in these additional systems.
(27) Steam generator secondary manways and handholds (CS)	Loss of material due to erosion	Inservice inspection	No	This line item applies to once-through steam generators and is therefore not applicable to Ginna Station.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(28) Reactor internals, reactor vessel closure studs, and core support pads	Loss of material due to wear	Inservice inspection	No	Consistent with items IV.A2.5-f, B2.1-l, B2.5-o, and B2.6-c of NUREG-1801. Loss of material due to wear was identified as an aging effect requiring management for the reactor vessel flange and internals components identified in NUREG-1801. However, loss of material due to wear was also identified for the reactor vessel closure studs and the core support pads for which no specific line items appear in the NUREG-1800 (SRP) table. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program was credited for managing loss of material due to wear for all components except the flux thimble tubes and the reactor vessel closure studs. For the flux thimble tubes, Ginna Station credits the Thimble Tubes Inspection Program for managing loss of material due to wear. This program was implemented in response to NRC Bulletin 88-09 which required that an inspection program be established to manage the effects of thimble wear for Westinghouse reactors with bottom-mounted instrumentation. The program provides for eddy current inspections at an appropriate frequency, includes acceptance criteria and corrective actions and has effectively managed thimble tube wear at Ginna Station (see Appendix B). The Reactor Head Closure Studs Program (see Appendix B) is credited for managing loss of material due to wear of reactor vessel closure studs (see Item 35).
(29) Pressurizer integral support	Crack initiation and growth due to cyclic loading	Inservice inspection	No	Consistent with NUREG-1801. Cracking due to flaw growth was identified as an aging effect requiring management for the pressurizer support skirt and flange. Flaw growth occurs as a result of cyclic loading. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program was credited for managing this aging effect. Although the aging effect identified by Ginna Station is not described as crack initiation and growth due to cyclic loading, cracking due to any mechanism would be acceptably managed by the ASME Section XI ISI Program.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(30) Upper and lower internals assembly (Westinghouse)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring	No	Not consistent with NUREG-1801. Loss of mechanical closure integrity due to stress-relaxation was identified as an aging effect requiring management for the holddown spring in the upper internals assembly and for the clevis-insert bolts in the lower internals assembly. However, the ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program was credited for managing this aging effect. Ginna Station does not employ loose-parts or neutron noise monitoring methods for aging management as referenced in NUREG-1801. This item will therefore be included in Table 3.2-2.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(31) Reactor vessel internals in fuel zone region (except Westinghouse and Babcock & Wilcox [B&W] baffle bolts)	Loss of fracture toughness due to neutron irradiation embrittlement, and void swelling	PWR vessel internals; water chemistry	No	Consistent with NUREG-1801. Loss of fracture toughness due to neutron irradiation embrittlement was identified as an aging effect requiring management for reactor vessel internals components in the fuel zone. However, void swelling was not specifically identified as an aging mechanism. The results of recent destructive examinations of one of the Ginna Station baffle/former bolts removed during the 1999 refueling outage suggest that void swelling should not represent a concern during the period of extended operation (see discussion in Item 8). In addition, the lower support forging and the core barrel outlet nozzle were not included among the components subject to significant irradiation embrittlement because of their location remote from the fuel zone. The aging management program referred to in NUREG-1801 is the PWR Vessel Internals Program. However, the SRP references Water Chemistry as well as the PWR Vessel Internals Program. Nevertheless, the Reactor Vessel Internals Program is credited with managing loss of fracture toughness due to neutron irradiation embrittlement and void swelling for the internals components in this component grouping. Ginna Station will incorporate applicable results of industry initiatives related to void swelling in the Reactor Vessel Internals Program as they become available.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(32) Steam generator upper and lower heads; tubesheets; primary nozzles and safe ends	Crack initiation and growth due to SCC, PWSCC and IASCC	Inservice inspection; water chemistry	No	Consistent with NUREG-1801. The only components in this grouping applicable to Ginna Station are the primary nozzles and safe ends (NUREG-1801, Item IV D1.1-i). The steam generator primary head, inlet and outlet nozzles, and manways at Ginna Station are low-alloy steel clad with austenitic stainless steel weld overlay. The primary nozzle safe ends are Type 316 stainless steel. Since the interior (clad) surface of the nozzles, manway, and head are exposed to the same environment, the primary head and manways are included with this component grouping. Crack initiation and growth due to SCC was identified as an aging effect requiring management for the stainless steel-clad primary head, inlet and outlet nozzles, manways, and stainless steel safe ends. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program and the Water Chemistry Control Program are credited for managing applicable aging effects for components in this grouping.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(33) Vessel internals (except Westinghouse and B&W baffle former bolts)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry	No	Consistent with NUREG-1801. Ginna Station credited either the Water Chemistry Control Program alone (for components subject to SCC) or in combination with the Reactor Vessel Internals Program (for components subject to IASCC) for management of crack initiation and growth due to SCC/IASCC. Crack initiation and growth due to SCC was identified as an aging effect requiring management for all reactor vessel internals components fabricated from stainless steel. Crack initiation and growth due to IASCC was identified as an aging effect requiring management for those components exposed to neutron fluence $>10^{21}$ n/cm^2 in the core. However, the Ginna Station evaluation determined that not all components listed in NUREG-1801 were considered susceptible to crack initiation and growth due to IASCC. This is a result of fluence exposures being less than the threshold value of 10^{21} n/cm^2. In addition, plant-specific data obtained from destructive evaluation of Type 347 stainless steel baffle/former bolts removed in 1999 indicated very limited evidence of IASCC. Those components determined by evaluation not to be susceptible to IASCC are enumerated in Table 3.2-2.
(34) Reactor internals (B&W screws and bolts)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	The components in this grouping are not applicable to Ginna Station.
(35) Reactor vessel closure studs and stud assembly	Loss of material due to wear	Reactor head closure studs	No	Consistent with NUREG-1801. Loss of material due to wear was identified as an aging effect requiring management for the reactor vessel closure studs. The Reactor Head Closure Studs Program is credited with managing this effect.

Table 3.2-1 Reactor Coolant System - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(36) Reactor internals (Westinghouse upper and lower internal assemblies; CE bolts and tie rods)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	Loss of mechanical closure integrity due to stress relaxation was identified as an aging effect requiring management for the upper and lower support plate column bolts. The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program is credited for managing this aging effect. Therefore this is consistent with NUREG-1801. NUREG-1801 cites the Loose Parts Monitoring Program as well as the ASME Section XI ISI Program. However, loose-parts monitoring is not considered to be effective as an aging management program at Ginna Station. This is not consistent with NUREG-1801 and will be further discussed in Table 3.2-2.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(1) RPV Closure Head Dome, Closure Head Flange, Vessel Flange, Upper Shell, Primary Inlet Nozzles, Primary Outlet Nozzles, Intermediate Shell (including circumferential Beltline weld), Lower Shell, Bottom Head Torus, Bottom Head Dome	Low-Alloy Steel with Stainless Steel Cladding	Primary Water	Cracking due to SCC	Water Chemistry Control Program	Cracking due to SCC is not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
BMI Guide Tubes, Seal Table Fittings	Stainless Steel				

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(2) RPV Closure Head Dome, Closure Head Flange, Vessel Flange, Upper Shell, Primary Inlet Nozzles, Primary Outlet Nozzles, Intermediate Shell (including circumferential weld), Lower Shell, Bottom Head Torus, Bottom Head Dome	Low-Alloy Steel with Stainless Steel Cladding	Primary Water	Cracking due to Flaw Growth	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to flaw growth is not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
Primary Nozzle Safe Ends BMI Guide Tubes Core Support Pads	Stainless Steel Weld Butter Stainless Steel Alloy 600			ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	
CRDM Head Housing Tubes (Head Adapters), Vent Pipe, Instrumentation Tubes and Safe Ends	Alloy 600			Reactor Vessel Head Penetration Inspection Program ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(3) RPV Core Support Pads	Alloy 600	Primary Water	Loss of Material due to Wear	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Loss of material due to wear was not identified as an aging effect requiring management in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(4) RPV Primary Inlet and Outlet Nozzles and Upper Shell	Low-Alloy Steel with Stainless Steel Cladding	Primary Water	Loss of Fracture Toughness due to Neutron Irradiation Embrittlement	Reactor Vessel Surveillance Program	As discussed in Table 3.2-1 Line Number (4) the RPV upper shell and the lower sides of the primary inlet and outlet nozzles are not subject to significant neutron irradiation embrittlement because of their physical distance from the reactor core. Therefore loss of fracture toughness due to neutron irradiation embrittlement is not identified as an aging effect requiring management at Ginna Station. This is not consistent with NUREG-1801.
(5) RPV Ventilation Shroud Support Ring, Refueling Seal Ledge, Upper Shell, Primary Inlet Nozzles, Primary Outlet Nozzles, Intermediate Shell, Lower Shell, Bottom Head Torus, Bottom Head Dome (CS Components)	Carbon/Low-Alloy Steel	Borated Water Leaks	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion Program	Loss of material due to boric acid corrosion of external surfaces of these components was not identified as an aging effect requiring management in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(6) Closure Studs, Nuts, Washers	Carbon/Low-Alloy Steel	Containment Air	Loss of Mechanical Closure Integrity due to Stress Relaxation	Reactor Head Closure Studs Program	Loss of mechanical closure integrity due to stress relaxation was not identified in NUREG-1801 as an aging effect requiring management for the reactor vessel closure studs. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(7) Lower Core Plate and Fuel Pins, Lower Support Forging, Lower Support Columns, Core Barrel and Flange, Radial Keys and Clevis Inserts, Baffle and Former Assembly, Core Barrel Outlet Nozzle, Upper Support Plate Assembly, Upper Core Plate and Fuel Alignment Pins, Upper Support Columns, RCCA Guide Tubes and Flow Downcomers, Guide Tube Support Pins, Upper Core Plate Alignment Pins, Holddown Spring, Thermal Shield and Neutron Panels, Bolting for all Bolted Closures	Stainless Steel, Alloy 600 (Clevis Inserts), Alloy X-750 (Guide Tube Support Pins)	Primary Water	Changes in Dimension due to Void Swelling	Reactor Vessel Internals Program	As discussed in Table 3.2-1 Line Number (8) change in dimension due to void swelling was not explicitly identified as an aging effect requiring management for these components at Ginna Station. However, the Reactor Vessel Internals Program manages the effects of void swelling should it become a concern.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(8) Lower Support Forging, Core Barrel Outlet Nozzle	Forged Stainless Steel	Primary Water	Loss of Fracture Toughness due to Irradiation Embrittlement	Reactor Vessel Internals Program Water Chemistry Control Program Program	As discussed in Table 3.2-1 Line Number (31) at Ginna Station, loss of fracture toughness due to irradiation embrittlement was not identified as an aging effect requiring management in the AMR for these components because of their location remote from the fuel zone. In addition, void swelling was not explicitly identified as an applicable aging mechanism, although the Reactor Vessel Internals Inspection program manages the effects of void swelling should it become a concern.
(9) Lower Support Forging, Radial Keys and Clevis Supports, Core Barrel Outlet Nozzle, Upper Support Plate Assembly, Upper Core Plate and Fuel Alignment Pins, Upper Support Columns, RCCA Guidetubes and Flow Downcomers, Upper Core Plate Alignment Pins, Holddown Spring, Upper Support Column Bolting, Guide Tube Bolts, Clevis Insert Bolts	Stainless Steel	Primary Water	Cracking due to IASCC	Reactor Vessel Internals Program Water Chemistry Control Program Program	As discussed in Table 3.2-1 Line Number (33) cracking due to IASCC was not identified as an aging effect requiring management in the AMR for these components because neutron fluence exposure is below the threshold value for IASCC susceptibility. That not withstanding, the aging management program(s) referenced are appropriate for the aging effects identified should cracking due to IASCC become a concern.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(10) Lower Core Plate and Fuel Pins, Core Barrel Flange, Fuel Alignment Pins, Guide Tube Support Pins, Holddown Spring	Stainless Steel	Primary Water	Loss of Material due to Wear	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Loss of material due to wear was not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(11) Secondary Core Support, Diffuser Plate, Guide Tube Support Pins, Head Vessel Alignment Pins, BMI Columns and Flux Thimbles, Head Cooling Spray Nozzles, Upper Instrumentation Column, Conduits and Supports	Stainless Steel	Primary Water	Cracking due to SCC	Water Chemistry Control Program	Cracking due to SCC was not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(12) Upper and Lower Internals Assembly - Holdown Spring, Upper and Lower Support Column Bolts, Clevis Insert Bolts	Stainless Steel	Primary Water	Loss of Preload due to Stress Relaxation	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	As discussed in Table 3.2-1 Line Number (30) and Table 3.2-1 Line Number (36) loss of mechanical closure integrity was identified as an aging effect requiring management for these components. However, loose parts or neutron noise monitoring programs are not used for the purpose of aging management at Ginna Station. This is not consistent with NUREG-1801.
(13) RCS Primary Loop Elbows RCS Valves ≥ 4 in. NPS, Valves < 4 in. NPS	CASS Wrought Stainless Steel	Primary Water	Cracking due to Flaw Growth	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to flaw growth is not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(14) RCS Valves ≥ 4 in. NPS, Valves < 4 in. NPS	Wrought Stainless Steel	Primary Water	Cracking due to SCC	Water Chemistry Control Program	Cracking due to SCC is not identified as an aging effect requiring management in NUREG-1801 for wrought stainless steel valves ≥ 4 in. NPS and < 4 in. NPS. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(15) Reactor Coolant Pump Thermal Barrier Flange, Thermal Barrier Heat Exchanger Tubing, Orifices and Reducers	Wrought Stainless Steel	Primary Water	Cracking due to SCC, Cracking due to Flaw Growth	Water Chemistry Control Program ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	The Reactor Coolant Pump Thermal Barrier Flange, Heat Exchanger Tubing, and Orifices and Reducers are not identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(16) Reactor Coolant Pump Lugs	Stainless Steel	Containment Air	Cracking due to Flaw Growth	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to flaw growth for the Reactor Coolant Pump Lugs is not identified as an aging effect requiring management in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(17) Pressurizer Safety Nozzle, Pressurizer Relief Nozzle	Carbon Steel with Stainless Steel Cladding	Primary Water	Cracking due to SCC, Cracking due to Flaw Growth	Water Chemistry Control Program ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	The Pressurizer Safety and Relief Nozzles are not explicitly identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(18) Pressurizer Manway Cover	Carbon Steel with Stainless Steel Disc Insert	Primary Water	Cracking due to SCC	Water Chemistry Control Program	The Pressurizer Manway Cover is not explicitly identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(19) Pressurizer Spray Nozzle, Relief Nozzle, Safety Nozzle, Surge Nozzle and Manway Cover (CS Components)	Carbon Steel with Stainless Steel Cladding or Disc Insert	Borated Water Leaks	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion Program	Loss of material due to boric acid corrosion was not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(20) SG Primary Channel Head, Primary Inlet and Outlet Nozzles, Primary Inlet and Outlet Nozzle Safe Ends, Steam Generator Shell and Transition Cone, Feedwater Nozzle, Steam Outlet Nozzle, Blowdown Piping Nozzle and Secondary-Side Shell Penetrations	Low-Alloy Steel with Stainless Steel Cladding Carbon Steel	Primary Water Secondary Water	Cracking due to Flaw Growth	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to Flaw Growth is not identified as an aging effect requiring management for these components in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(21) SG Tubesheet (Primary Side)	Low-Alloy Steel with Alloy 600 cladding	Primary Water	Cracking due to SCC Cracking due to Flaw Growth	Water Chemistry Control Program ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to SCC and flaw growth is not identified as an aging effect requiring management for the primary side of the SG tubesheet in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(22) SG Tubesheet (Secondary Side)	Low Alloy Steel	Secondary Water	Loss of Material due to General, Pitting and Crevice Corrosion Cracking due to Flaw Growth	Water Chemistry Control Program ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Loss of material due to general, pitting and crevice corrosion and cracking due to flaw growth are not identified as aging effects requiring management for the secondary side of the SG tubesheet in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(23) SG Primary Channel Head Divider Plate	Alloy 690	Primary Water	Cracking due to SCC	Water Chemistry Control Program	Cracking due to SCC is not identified as an aging effect requiring management for the SG divider plate in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(24) SG Feedwater Nozzle, Steam Outlet Nozzle, Steam Flow Restrictor, Blowdown Piping Nozzles and Secondary-Side Shell Penetrations, Secondary Closures, and Internal Shroud, Primary and Secondary Decks	Carbon/Low-Alloy Steel	Secondary Water	Loss of Material due to General, Pitting and Crevice Corrosion	Water Chemistry Control Program	Loss of material due to general, pitting and crevice corrosion was not identified in NUREG-1801 as an aging effect requiring management for these components exposed to the secondary-side SG environment. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(25) SG Lattice Grid Tube Supports, U-Bend Fan Bar Restraints	Stainless Steel	Secondary Water	Cracking due to SCC Loss of Material due to Pitting and Crevice Corrosion	Water Chemistry Control Program Steam Generator Tube Integrity Program	As discussed in Table 3.2-1 Line Number (17) cracking due to SCC and loss of material due to pitting and crevice corrosion were not identified as aging effects requiring management in NUREG-1801 for the lattice grid tube supports and U-bend fan bar restraints. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(26) SG Primary Inlet and Outlet Nozzles and Support Pads (CS Components)	Carbon/Low-Alloy Steel	Borated Water Leaks	Loss of Material due to Boric Acid Corrosion	Boric Acid Corrosion Program	Loss of material due to boric acid corrosion was not identified as an aging effect requiring management in NUREG-1801 for the external surfaces of the primary inlet and outlet nozzles and support pads. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(27) SG Support Pads, Seismic Lugs	Carbon Steel	Containment Air	Cracking due to Flaw Growth	ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection Program	Cracking due to flaw growth was not identified in NUREG-1801 as an aging effect requiring management for the support pads and seismic lugs. The aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(28) Non-Class 1 RCS Manual Valves, Solenoid-Operated Valves, Strainers, PORV Operators, Accumulators, Nitrogen Surge Tanks, Piping	Carbon Steel, Stainless Steel, CASS, Copper Alloy (Zn<15%) Stainless Steel	Air and Gas Air and Gas, Wetted (<140°F)	No Aging Effects	No AMP Required	Non-Class 1 RCS carbon steel, stainless steel, CASS and copper alloy components exposed to air and gas environments are not identified in NUREG-1801.
(29) Non-Class 1 RCS Piping	Carbon Steel	Air and Gas, Wetted (<140°F)	Loss of Material due to General, Crevice, Pitting, Galvanic Corrosion and MIC	Periodic Surveillance and Preventive Maintenance	Non-Class 1 RCS carbon steel piping exposed to a wetted air and gas (<140°F) environment is not identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(30) Reactor Coolant Pump Upper Bearing Cooler	Carbon Steel	Treated Water - Other	Loss of Material due to General, Crevice, and Galvanic Corrosion and MIC	Water Chemistry Control Program	The Reactor Coolant Pump upper bearing cooler is a Non-Class 1 RCS component which is not identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(31) Reactor Coolant Pump Motor Upper and Lower Bearing Cooling Coil	Copper Alloy (Zn<15%, Zn>15%)	Oil and Fuel Oil	Loss of Material due to MIC	Periodic Surveillance and Preventive Maintenance	The Reactor Coolant Pump Motor upper and lower bearing cooling coils are Non-Class 1 components which are not identified in NUREG-1801. Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
		Treated Water - Other	Loss of Material due to MIC, Crevice and Galvanic Corrosion, and Selective Leaching	Water Chemistry Control Program	
		Treated Water - Other	Loss of Heat Transfer due to Particulate and Biological Fouling	Water Chemistry Control Program	
(32) Seal Table	Stainless Steel	Treated Water - Borated (<140°F)	Loss of Material due to Crevice and Pitting Corrosion and MIC	Water Chemistry Control Program One-Time Inspection Program	The seal table is a Non-Class 1 component which is not identified in NUREG-1801 Although these component types are not included in the NUREG, the aging management program(s) referenced are appropriate for the aging effects identified and provide assurance that the aging effects are effectively managed through the period of extended operation.
(33) External Surfaces of Carbon/Low-Alloy Steel Components in Reactor Coolant System	Carbon/Low Alloy Steel	Containment Atmosphere (≥212°F)	No Aging Effects	No AMP Required	External surfaces of carbon/low-alloy steel components in the Reactor Coolant System exposed to the Containment atmosphere are not identified in NUREG-1801. No aging effects are identified for those components which normally operate at temperatures ≥ 212°F. For components with service temperatures < 212°F, loss of material due to general and pitting corrosion is an applicable aging effect which is effectively managed by the Systems Monitoring Program.
		Containment Atmosphere (<212°F)	Loss of Material due to General and Pitting Corrosion	Systems Monitoring Program	

Table 3.2-2 Reactor Coolant System - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(34) External Surfaces of Stainless Steel and Nickel-Alloy Components in Reactor Coolant System	Stainless Steel Nickel Alloy	Borated Water Leaks Containment Atmosphere	No Aging Effects	No AMP Required	External surfaces of stainless steel and nickel alloy components in the Reactor Coolant System exposed to the Containment atmosphere or borated water leaks are not identified in NUREG-1801. There are no applicable aging effects for stainless steel or nickel alloy components exposed to borated water leaks or the Containment atmosphere.

Section 3.2 References

1. WCAP-14575-A, Aging Management Evaluation for Class I Piping and Associated Pressure Boundary Components, December, 2000.
2. WCAP-14577, Rev. 1-A, License Renewal Evaluation: Aging Management for Reactor Internals, March, 2001.
3. WCAP-14574-A, License Renewal Evaluation: Aging Management Evaluation for Pressurizers, December, 2000.

3.3 Aging Management of Engineered Safety Features Systems

The results of the aging management review of the Engineered Safety Features Systems components are provided in this section and summarized in Tables 3.3-1 and 3.3-2. Table 3.3-1 shows the aging management of system components evaluated in NUREG-1801 that are relied on for license renewal of the Engineered Safety Features Systems components at Ginna. Included in the table is a discussion column. The discussion column will provide a conclusion indicating if the aging management evaluation results are consistent with NUREG-1801 along with any clarifications or explanations required to support the stated conclusion if that conclusion is different than those of the NUREG. For a determination to be made that a table line item is "Consistent with NUREG-1801" several criteria must be met. First the plant specific component is reviewed against the GALL to ensure that the component, materials of construction and internal or external service environment are comparable to those described in a particular GALL item. Second, for those that are comparable, the results of the plant aging management review- aging effect evaluation are compared to the aging effects/mechanisms in the GALL. Finally, the programs credited in the GALL for managing those aging effects are compared to the programs invoked in the plant evaluation. If, using good engineering judgment, it could be reasonably concluded that the plant evaluation is in agreement with the GALL evaluation a line item was considered consistent with NUREG-1801. There are cases where components and component material/environment combinations and aging effects are common between a NUREG-1801 line item and the plant evaluation but the aging management program selections differ. In those cases the discussion column will indicate the plant aging management program selection but no conclusion will be made that the line item is consistent with the GALL. Table 3.3-2 contains the Engineered Safety Features Systems components aging management review results that are not addressed in NUREG-1801. A plant component is considered not addressed by the NUREG if the component type is not evaluated in the GALL or has a different material of construction or operating environment than evaluated in the GALL. This table includes the component types, materials, environments, aging effects requiring management, the programs and activities for managing aging, and a discussion column. To avoid confusion, no attempt was made to interrelate material/environment/aging effects from one NUREG-1801 chapter to another. Note that these tables only include those components, materials and environments that are applicable to a PWR.

Materials

The materials of construction of a component have a major influence on the evaluation of aging effects applicable to the component. Sources of information used to identify materials of construction include original equipment specifications, vendor technical manuals and drawings, fabrication drawings, piping line specifications, modification design records and field walkdowns/verifications. The tables below account for the materials of construction for the components requiring an aging management review. Since similar materials are susceptible to the same aging effects/mechanisms, the tables itemize the component types (i.e., groupings) while factoring in the materials of construction.

Environment

As previously described, the environment(s) to which components are exposed are critical in the determination of potential aging mechanisms and effects. A review of plant design documentation was performed to quantify the environmental conditions to which Ginna Station equipment is exposed. This review identified that some equipment is exposed to a variety of environments. This can include normal operating conditions and post accident conditions. Since aging mechanisms and effects will be primarily driven by the environmental conditions to which equipment is exposed on a daily basis, under normal operating conditions, these conditions will differ from the design parameters which are established based upon the worst case scenario (e.g., LOCA conditions). Ginna Station equipment environments may be categorized into basic external and internal environments detailed in Section 3.1.2.

Aging Effects Requiring Management

After the components requiring aging management review were identified and grouped by materials of construction and environment, a review of industry and plant-specific operating experience was performed. The purpose of this review was to assure that all applicable aging effects were identified, and to evaluate the effectiveness of existing aging management programs.

This experience review was performed utilizing various industry and plant-specific programs and databases. Industry operating experience sources included NRC Generic Publications (including Information Notices, Circulars, Bulletins, and Generic Letters), INPO Significant Operating Event Reports (SOER), EPRI Technical Reports, and other information sources, such as the B&W Owners Group Non-Class 1 Mechanical Tools Implementation document, Westinghouse Generic Technical Reports (GTRs), and the Generic Aging Lessons Learned (GALL) report.

Plant specific operating experience sources included Semi-annual and Annual Reports to AEC/NRC, Abnormal Occurrence and Licensee Event Reports (LERs), Non-Conformance Reports (NCRs), Corrective Action Reports (CARs), Refueling, Inspection and Overhaul Reports (RIOs), Inservice Inspection (ISI) Reports, Identified Deficiency Reports (IDRs), and ACTION Reports (ARs) from 1969 to the present. Information from these sources was compiled in various databases. Based upon the material of construction, the applicable environments, and operating experience the potential aging effects requiring management for each of the components was identified as documented in the tables below.

Time-Limited Aging Analysis

In addition to those identified in NUREG-1801, any additional time-limited aging analyses (TLAA) identified as appropriate to the system are identified in Section 4.0.

Conclusion

The programs and activities selected to manage the aging effects of the Engineered Safety Features Systems are identified in Table 3.3-1 and Table 3.3-2. A description of these aging management activities 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 system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.3-1 Engineered Safety Features Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(1) Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. Cumulative Fatigue Damage is addressed as a TLAA in Section 4.3.
(2) Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The combination of components, materials and environments identified in Items V.A.2-a and V.A.5-a are not applicable at Ginna Station. Components identified in Item V.C.1-a are included in the containment isolation valves and associated piping entry under line item 4 below in this table.
(3) Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	Consistent with NUREG-1801 (containment isolation components and RWST bottom). The One-Time Inspection Program manages these aging effects for RWST bottom. The Systems Monitoring Program is credited for managing all other applicable aging effects.
(4) Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion	Plant specific	Yes, plant specific	Consistent with NUREG-1801 (containment isolation components such as valves and pipe penetrations). The aging effect "loss of material due to microbiologically influenced corrosion (MIC)" is managed by the plant-specific Periodic Surveillance and Preventive Maintenance Program.
(5) High pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific	The high pressure safety injection pumps are not used for normal charging at Ginna Station. Loss of material due to erosion of miniflow orifices is not applicable at Ginna Station.
(6) Piping and fittings of CASS in emergency core cooling system	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	There are no CASS piping and fittings in the emergency core cooling system at Ginna Station which are subject to loss of fracture toughness due to thermal aging embrittlement.

Table 3.3-1 Engineered Safety Features Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(7) Components serviced by open-cycle cooling system	Local loss of material due to corrosion and/or buildup of deposit due to biofouling	Open-cycle cooling water system	No	The combination of components, materials and environments identified in Items V.A.6-a, V.A.6-b, V.D1.6-b and V.D1.6-c are not applicable at Ginna Station.
(8) Components serviced by closed-cycle cooling system	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	No	Consistent with NUREG-1801. The Closed-Cycle (Component) Cooling Water System Program is credited with managing the aging effect "loss of material due to general, pitting and crevice corrosion." The program includes maintenance of corrosion inhibitor concentrations to minimize corrosion and periodic surveillance testing and inspections to evaluate system and component performance and condition.
(9) Pumps, valves, piping, and fittings in containment spray and emergency core cooling systems	Crack initiation and growth due to SCC	Water chemistry	No	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. Although the aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG, the Water Chemistry Control Program credited for managing the aging effects for all temperatures is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. A One-Time Inspection Program is also credited to verify the adequacy of the Water Chemistry Control program.
(10) Carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Program is credited with managing the aging effect "loss of material due to boric acid corrosion."

Table 3.3-1 Engineered Safety Features Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(11) Closure bolting in high pressure or high temperature systems	Loss of material due to general corrosion, loss of preload due to stress relaxation, and crack initiation and growth due to cyclic loading or SCC	Bolting integrity	No	Consistent with NUREG-1801. The Bolting Integrity Program is credited for managing the aging effects "loss of material due to general corrosion and crack initiation and growth due to cyclic loading and SCC." There are no bolts with a specified minimum yield strength > 150 ksi in the ESF Systems. Therefore, SCC is not an applicable aging effect/mechanism.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(1) ACCUMULATOR	Carbon/Low Alloy Steel	Containment	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(2) BLOWER CASING	Carbon/Low Alloy Steel	Air and Gas (Wetted) < 140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(3) BLOWER CASING	Carbon/Low Alloy Steel	Containment	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(4) CONTROLLER[1]	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(5) CONTROLLER[1]	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(6) CONTROLLER[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(7) DELAY COIL	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(8) EDUCTOR	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(9) FASTENERS (BOLTING)	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Cracking due to SCC	Bolting Integrity Program	There are no bolts with a specified minimum yield strength > 150 ksi in this system. Therefore, SCC is not an applicable aging effect/mechanism.
(10) FASTENERS (BOLTING)	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Loss of Preload due to Stress Relaxation	Bolting Integrity Program	Material and environment grouping are included in NUREG-1801. Aging effect of loss of preload due to stress relaxation is applicable, but is not included in Chapter V - Section E, Chapter VII - Section I, or Chapter VIII - Section H of the NUREG.
(11) FASTENERS (BOLTING)	Stainless Steel	Borated Water Leaks	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(12) FILTER HOUSING	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(13) FILTER HOUSING	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(14) FLANGE	Carbon/Low Alloy Steel	Containment	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(15) FLANGE	Carbon/Low Alloy Steel	Outdoor	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(16) FLOW ELEMENT	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(17) FLOW ELEMENT	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(18) FLOW ELEMENT	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(19) FLOW ELEMENT	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(20) FLOW NOZZLES	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(21) FLOW NOZZLES	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(22) HEAT EXCHANGER	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Consistent with Item E.1-b of NUREG-1801. Volume 1, Table 2 includes "External surface of carbon steel components" with a plant specific aging management program. This material and environment grouping is not included in NUREG-1800 Table 3.2-1. The Systems Monitoring Program is credited for managing this aging effect.
(23) HEAT EXCHANGER	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(24) HEAT EXCHANGER	Cast Iron	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(25) HEAT EXCHANGER	Cast Iron	Raw Water	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(26) HEAT EXCHANGER	HX-Cast Iron[2]	Oil and Fuel Oil	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(27) HEAT EXCHANGER	HX-Cast Iron[2]	Raw Water	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(28) HEAT EXCHANGER	HX-Nickel Alloy[2]	Treated Water Borated <140	Loss of Heat Transfer	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(29) HEAT EXCHANGER	HX-Nickel Alloy[2]	Treated Water Other	Loss of Heat Transfer	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(30) HEAT EXCHANGER	Nickel Alloy	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(31) HEAT EXCHANGER	Nickel Alloy	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(32) HEAT EXCHANGER	Nickel Alloy	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(33) HEAT EXCHANGER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(34) INDICATOR[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(35) ORIFICE	Cast Austenitic Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(36) ORIFICE	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(37) ORIFICE	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(38) ORIFICE	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(39) ORIFICE	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(40) PIPE	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(41) PIPE	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(42) PIPE	Carbon/Low Alloy Steel	Buried	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(43) PIPE	Copper Alloy (Zn < 15%)	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(44) PIPE	Copper Alloy (Zn < 15%)	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(45) PIPE	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(46) PIPE	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(47) PIPE	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(48) PIPE	Stainless Steel	Concrete	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(49) PIPE	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(50) PIPE	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(51) PIPE	Stainless Steel	Outdoor	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(52) PIPE	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(53) PIPE	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(54) PUMP CASING	Cast Austenitic Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(55) PUMP CASING	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(56) PUMP CASING	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(57) PUMP CASING	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(58) PUMP CASING	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(59) RECOMBINER CASING	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(60) RECOMBINER CASING	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(61) SWITCH[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(62) TANK	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(63) TANK	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(64) TANK	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(65) TEMPERATURE ELEMENT[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(66) THERMOWELL	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(67) THERMOWELL	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(68) TRANSMITTER[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(69) VALVE BODY	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(70) VALVE BODY	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(71) VALVE BODY	Cast Austenitic Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(72) VALVE BODY	Cast Austenitic Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(73) VALVE BODY	Cast Austenitic Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(74) VALVE BODY	Cast Austenitic Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(75) VALVE BODY	Cast Austenitic Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(76) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(77) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(78) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Cracking due to SCC	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(79) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(80) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(81) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(82) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(83) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(84) VALVE BODY	Cast Iron	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(85) VALVE BODY	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(86) VALVE BODY	Copper Alloy (Zn < 15%)	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(87) VALVE BODY	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(88) VALVE BODY	Copper Alloy (Zn < 15%)	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(89) VALVE BODY	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(90) VALVE BODY	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(91) VALVE BODY	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(92) VALVE BODY	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(93) VALVE BODY	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(94) VALVE BODY	Stainless Steel	Outdoor	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(95) VALVE BODY	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.3-2 Engineered Safety Features Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Type	Material Type	Environment Type	AERMs	Program/Activity	Discussion
(96) VALVE BODY	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(97) VENTILATION DUCTWORK	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(98) VENTILATION DUCTWORK	Galvanized Carbon Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

1. Selected instruments were conservatively included within the scope of License Renewal. Consideration was given to the consequences of an instrument housing pressure boundary failure. Where an instrument was unisolable from a pressure source and is of sufficient size that a system function would be degraded should the pressure boundary fail, that instrument is included for License Renewal review.
2. Material prefixes with HX are used to identify heat exchanger materials which perform a heat transfer intended function in addition to the typical material usage function of pressure boundary.

3.4 Aging Management of Auxiliary Systems

The results of the aging management review of the Auxiliary Systems components are provided in this section and summarized in Tables 3.4-1 and 3.4-2. Table 3.4-1 shows the aging management of system components evaluated in NUREG-1801 that are relied on for license renewal of the Auxiliary Systems components at Ginna. Included in the table is a discussion column. The discussion column will provide a conclusion indicating if the aging management evaluation results are consistent with NUREG-1801 along with any clarifications or explanations required to support the stated conclusion if that conclusion is different those of the NUREG. For a determination to be made that a table line item is "Consistent with NUREG-1801" several criteria must be met. First the plant specific component is reviewed against the GALL to ensure that the component, materials of construction and internal or external service environment are comparable to those described in a particular GALL item. Second, for those that are comparable, the results of the plant aging management review- aging effect evaluation are compared to the aging effects/mechanisms in the GALL. Finally, the programs credited in the GALL for managing those aging effects are compared to the programs invoked in the plant evaluation. If, using good engineering judgment, it could be reasonably concluded that the plant evaluation is in agreement with the GALL evaluation a line item was considered consistent with NUREG-1801. There are cases where components and component material/environment combinations and aging effects are common between a NUREG-1801 line item and the plant evaluation but the aging management program selections differ. In those cases the discussion column will indicate the plant aging management program selection but no conclusion will be made that the line item is consistent with the GALL. Table 3.4-2 contains the Auxiliary Systems components aging management review results that are not addressed in NUREG-1801. A plant component is considered not addressed by the NUREG if the component type is not evaluated in the GALL or has a different material of construction or operating environment than evaluated in the GALL. This table includes the component types, materials, environments, aging effects requiring management, the programs and activities for managing aging, and a discussion column. To avoid confusion, no attempt was made to interrelate material/environment/aging effects from one NUREG-1801 chapter to another. Note that these tables only include those components, materials and environments that are applicable to a PWR.

Materials

The materials of construction of a component have a major influence on the evaluation of aging effects applicable to the component. Sources of information used to identify materials of construction include original equipment specifications, vendor technical manuals and drawings, fabrication drawings, piping line specifications, modification design records and field walkdowns/verifications. The tables below account for the materials of construction for the components requiring an aging management review. Since similar materials are susceptible to the same aging effects/mechanisms, the tables itemize the component types (i.e., groupings) while factoring in the materials of construction.

Environment

As previously described, the environment(s) to which components are exposed are critical in the determination of potential aging mechanisms and effects. A review of plant design documentation was performed to quantify the environmental conditions to which Ginna Station equipment is exposed. This review identified that some equipment is exposed to a variety of environments. This can include normal operating conditions and post accident conditions. Since aging mechanisms and effects will be primarily driven by the environmental conditions to which equipment is exposed on a daily basis, under normal operating conditions, these conditions will differ from the design parameters which are established based upon the worst case scenario (e.g., LOCA conditions). Ginna Station equipment environments may be categorized into basic external and internal environments detailed in Section 3.1.2.

Aging Effects Requiring Management

After the components requiring aging management review were identified and grouped by materials of construction and environment, a review of industry and plant-specific operating experience was performed. The purpose of this review was to assure that all applicable aging effects were identified, and to evaluate the effectiveness of existing aging management programs.

This experience review was performed utilizing various industry and plant-specific programs and databases. Industry operating experience sources included NRC Generic Publications (including Information Notices, Circulars, Bulletins, and Generic Letters), INPO Significant Operating Event Reports (SOER), EPRI Technical Reports, and other information sources, such as the B&W Owners Group Non-Class 1 Mechanical Tools Implementation document, Westinghouse Generic Technical Reports (GTRs), and the Generic Aging Lessons Learned (GALL) report.

Plant specific operating experience sources included Semi-annual and Annual Reports to AEC/NRC, Abnormal Occurrence and Licensee Event Reports (LERs), Non-Conformance Reports (NCRs), Corrective Action Reports (CARs), Refueling, Inspection and Overhaul Reports (RIOs), Inservice Inspection (ISI) Reports, Identified Deficiency Reports (IDRs), and ACTION Reports (ARs) from 1969 to the present. Information from these sources was compiled in various databases. Based upon the material of construction, the applicable environments, and operating experience the potential aging effects requiring management for each of the components was identified as documented in the tables below.

Time-Limited Aging Analysis

In addition to those identified in NUREG-1801, any additional time-limited aging analyses (TLAA) identified as appropriate to the system are identified in Section 4.0.

Conclusion

The programs and activities selected to manage the aging effects of the Auxiliary Systems are identified in Table 3.4-1 and Table 3.4-2. A description of these aging management activities 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 system components will be adequately managed so that there is reasonable assurance that the intended function(s) will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(1) Components in spent fuel pool cooling and cleanup	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. The Water Chemistry Control Program is credited with managing the aging effects of loss of material due to general, pitting, and crevice corrosion. The One-Time Inspection as well as the Periodic Surveillance and Preventive Maintenance Programs will be used to verify the effectiveness of the Water Chemistry Control Program.
(2) Linings in spent fuel pool cooling and cleanup system; seals and collars in ventilation systems	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The Spent Fuel Cooling system (Section A3 of the NUREG) at Ginna Station contains no components that are elastomer lined. For ventilation systems, the One-Time Inspection and Periodic Surveillance and Preventive Maintenance Programs are credited for managing the hardening, cracking and loss of strength aging effects. The Systems Monitoring Program is credited for managing the aging effect of loss of material due to wear.
(3) Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Consistent with NUREG-1801. Cumulative Fatigue Damage is addressed as a TLAA in Section 4.3.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(4) Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR)	Crack initiation and growth due to SCC or cracking	Plant specific	Yes, plant specific	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. The aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG. That not withstanding, the Water Chemistry Control Program, credited for managing the aging effects for all temperatures, is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. The One-Time Inspection Program as well as the Periodic Surveillance and Preventive Maintenance Program are credited with verifying the adequacy of the Chemistry program.
(5) Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant specific	Yes, plant specific	Consistent with NUREG-1801. For the internal environments of ventilation systems, the diesel fuel oil systems, and the emergency diesel generator system, the One-Time Inspection , Periodic Surveillance and Preventive Maintenance , Closed-Cycle (Component) Cooling Water System , and the Fuel Oil Chemistry Programs are credited for managing applicable aging effects. For the external surfaces of all carbon steel components, the Systems Monitoring Program will be credited for managing the aging effects of loss of material.
(6) Components in reactor coolant pump oil collect system of fire protection	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801. The aging effects of components within the Reactor Coolant Pump Oil Collection system will managed by the One-Time Inspection Program. In addition, selected components will be inspected on a periodic basis in conjunction with the Periodic Surveillance and Preventive Maintenance Program.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(7) Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	The Fuel Oil Chemistry Program is credited with managing applicable aging effects. In lieu of the One-Time Inspection Program, Ginna Station has chosen to use the Periodic Surveillance and Preventive Maintenance Program to verify the adequacy of the Fuel Oil Chemistry Program in managing these aging effects.
(8) Heat exchangers in chemical and volume control system	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and a plant-specific verification program	Yes, plant specific	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. The aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG. That not withstanding, the Water Chemistry Control Program, credited for managing the aging effects for all temperatures, is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. The One-Time Inspection Program as well as the Periodic Surveillance and Preventive Maintenance Program are credited with verifying the adequacy of the Water Chemistry Control Program.
(9) Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant specific	Yes, plant specific	Consistent with NUREG-1801. The Periodic Surveillance and Preventive Maintenance Program will direct the scheduling of activities that will detect applicable aging effects under the Spent Fuel Pool Neutron Absorber Monitoring Program.
(10) New fuel rack assembly	Loss of material due to general, pitting, and crevice corrosion	Structures monitoring	No	Consistent with NUREG-1801. The Structures Monitoring Program is credited with managing the aging effects of loss of material due to general, pitting, and crevice corrosion.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(11) Spent fuel storage racks and valves in spent fuel pool cooling and cleanup	Crack initiation and growth due to stress corrosion cracking	Water chemistry	No	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. The aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG. That not withstanding, the Water Chemistry Control Program, credited for managing the aging effects for all temperatures, is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. The One-Time Inspection Program as well as the Periodic Surveillance and Preventive Maintenance Program are credited with verifying the adequacy of the Chemistry program.
(12) Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex monitoring	No	Consistent with NUREG-1801. The Spent Fuel Pool Neutron Absorber Monitoring Program is functionally equivalent to the Boraflex Monitoring Program. However, borated stainless steel neutron absorber panels (line item 9 above) are included in the scope of this monitoring program. Existing boraflex neutron absorber panels are not credited in the CLB for reactivity control in the Spent Fuel Pool, and therefore are excluded from the scope of this monitoring program. The Spent Fuel Pool Neutron Absorber Monitoring Program manages the aging effects of reduction of neutron absorbing capacity and loss of material due to general corrosion of the borated stainless steel panels.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(13) Closure bolting and external surfaces of carbon steel and low-alloy steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Program is credited with managing the aging effect of loss of material due to boric acid corrosion on the external surfaces of carbon/low alloy steel components (including closure bolting). Although not addressed in the NUREG, the following additional systems at Ginna Station contain carbon/low alloy steel components and have the potential for exposure to boric acid spillage (located in Containment or the Auxiliary Building) and are included in this evaluation: Component Cooling Water, Service Water, Fire Protection, Containment Ventilation, Essential Ventilation, Waste Disposal, Radiation Monitoring, and Cranes, Hoists and Lifting Devices.
(14) Components in or serviced by closed-cycle cooling water system	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	No	Consistent with NUREG-1801. Components within the Chemical and Volume Control, Component Cooling Water, Waste Disposal, and the Emergency Power systems are subject to the Closed-Cycle (Component) Cooling Water System Program. This program is credited with managing the aging effects of loss of material due to general, pitting, and crevice corrosion as well as micro-biologically influenced corrosion (MIC).
(15) Cranes including bridge and trolleys and rail system in load handling system	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	No	The Periodic Surveillance and Preventive Maintenance Program implements the Inspection of Heavy Load and Refueling Handling Systems procedures at Ginna Station. The periodic inspections are credited with managing the aging effects of loss of material due to general corrosion and wear.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(16) Components in or serviced by open-cycle cooling water systems	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	No	Consistent with NUREG-1801. Components within the Service Water, Component Cooling Water, Containment Ventilation, Spent Fuel Cooling, and the Emergency Power systems are subject to the Open-Cycle Cooling (Service) Water System Program as implemented by the Service Water System Reliability Optimization Program (SWSROP). This program is credited with managing the aging effects of loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling. The Periodic Surveillance and Preventive Maintenance Program is used at Ginna Station to verify the effectiveness of the Open-Cycle Cooling (Service) Water System Program.
(17) Buried piping and fittings	Loss of material due to general, pitting, and crevice corrosion, and MIC	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	The Buried Piping and Tanks Inspection Program is implemented by the Periodic Surveillance and Preventive Maintenance Program at Ginna Station. Tanks in the Emergency Power system are periodically inspected for signs of applicable aging effects. In addition, a one-time ultrasonic inspection will be performed to verify the effectiveness of the Preventive Maintenance Program. For buried piping, the Fire Water System Program is credited for managing the effects of aging for buried cast iron piping and fittings. External surfaces of buried piping are visually examined during maintenance activities (inspections of opportunity) performed as a result of performance tests. No evidence of age-related degradation has been detected from inspections performed to date. Cast iron fire system and service water piping at Ginna Station is ductile cast iron, not gray cast iron. Ductile irons are not susceptible to loss of structural integrity due to selective leaching mechanisms, and generally display excellent resistance to general corrosion due to exposure to non-aggressive ground water. Ground water/lake water at Ginna Station is analyzed periodically and analyses performed to date confirm that the water is non-aggressive.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(18) Components in compressed air system	Loss of material due to general and pitting corrosion	Compressed air monitoring	No	The Instrument and Service Air systems are not in scope to License Renewal and therefore not subject to an aging management review.
(19) Components (doors and barrier penetration seals) and concrete structures in fire protection	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	No	Consistent with NUREG-1801. The Fire Protection Program is credited with managing the aging effects of loss of material due to wear and general corrosion and hardening and shrinkage for components/structures that act as fire barriers.
(20) Components in water-based fire protection	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	No	Consistent with NUREG-1801. The Fire Water System Program is credited with managing the aging effects of loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling. At Ginna Station, the Periodic Surveillance and Preventive Maintenance Program is used to verify the effectiveness of the Fire Water System Program.
(21) Components in diesel fire system	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	No	The Fuel Oil Chemistry Program is credited with managing the applicable aging effects. At Ginna Station, the Periodic Surveillance and Preventive Maintenance Program is used to verify the effectiveness of this program.
(22) Tanks in diesel fuel oil system	Loss of material due to general, pitting, and crevice corrosion	Above ground carbon steel tanks	No	There are no aboveground diesel fuel oil tanks in the Emergency Power system at Ginna Station.
(23) Closure bolting	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	No	The Bolting Integrity Program is credited for managing the aging effects "loss of material due to general corrosion, loss of preload due to stress relaxation, and crack initiation and growth due to cyclic loading and SCC." There are no bolts with a specified minimum yield strength > 150 ksi in the Auxiliary Systems. Therefore, SCC is not an applicable aging mechanism.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(24) Components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink	Loss of material due to selective leaching	Selective leaching of materials	No	In addition to the Open-Cycle Cooling (Service) Water System and Closed-Cycle (Component) Cooling Water System Programs, the Periodic Surveillance and Preventive Maintenance Program or the One-Time Inspection Program will be credited with managing the aging effect of loss of material for components within the Open and Closed-Cycle Cooling Water systems.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(25) Fire barriers, walls, ceilings and floors in fire protection	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring	No	The Fire Protection Program in conjunction with the Structures Monitoring Program identifies the evidence that an aging mechanism is present and active and also provides confirmation and verification of the absence of all types of aging effects. Indication of aging effects may be absent if the materials of construction, design specifications, and operational environment preclude an aging mechanism but, due to the long lead time necessary for some effects to manifest themselves, it is prudent to periodically assess the condition of SSCs regardless of the likelihood that a particular aging mechanism is applicable. The degradation of inaccessible concrete can create symptoms of aging effects that are detectable in accessible areas. Conversely, if aging effects are present in accessible areas it is sensible to extrapolate those effects into inaccessible areas and perform additional evaluations. Concrete in indoor and outdoor environments have been evaluated for the following aging mechanisms: Aging Mechanism: Freeze-Thaw Aging Effect: Loss of Material Evaluation: The contract-specified air contents are within the range specified by current revisions of ACI 318, and the contract-specified water-to-cement ratio meets the recommendations of ACI 318-63 ($\leq$ 0.53). Therefore, loss of material and cracking of concrete due to freeze-thaw are not probable aging effects at Ginna Station and have not been observed to date. Aging Mechanism: Aggressive Chemical Attack Aging Effect: Loss of Material, Changes in Material Properties Evaluation: Concrete degradation in air due to aggressive rainwater is insignificant and the below-grade/lake water environment is non-aggressive. Additionally, recent structural inspections revealed no evidence of degradation owing to aggressive chemical attack; therefore, loss of material and change in material properties due to aggressive chemical

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(25) (continued)				attack are not probable aging effects at Ginna Station and have not been observed to date. The Structures Monitoring Program requires periodic monitoring of ground/lake water to verify chemistry remains non-aggressive. Aging Mechanism: Corrosion of Embedded Steel Aging Effect: Loss of Material, Cracking, Loss of Bond Evaluation: Since the embedded steel is not exposed to an environment which is considered aggressive, loss of material, cracking, and loss of bond due to corrosion of embedded steel are not probable aging effects at Ginna Station and have not been observed to date. Aging Mechanism: Reaction with Aggregates Aging Effect: Cracking, Expansion Evaluation: During construction the aggregates were tested for potential reactivity in accordance with ASTM C227 and ASTM C295, cracking and expansion due to reaction with aggregates are not probable aging effects at Ginna Station and have not been observed to date. Aging Mechanism: Settlement Aging Effect: Cracking, Distortion, Increase in Component Stress Level Evaluation: All structures at Ginna Station are either founded on bedrock, steel foundation piles that are driven to bedrock, or have foundations that consist of caissons extending to bedrock. Structural inspections indicate no visible evidence of settlement since construction of the station. During the Systematic Evaluation Program, the NRC concluded that settlement of foundations and buried equipment is not a safety concern for Ginna Station. Cracking, distortion, and an increase in component stress levels due to settlement are not probable aging effects at Ginna Station and have not been observed to date.

Table 3.4-1 Auxiliary Systems - Aging Management Programs Evaluated in NUREG-1801 that are Relied on for License Renewal

Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
(25) (continued)				Aging Mechanism: Leaching of Calcium Hydroxide Aging Effect: Change in Material Properties Evaluation: The original construction specifications met the intent of ACI 201.2R. Change in material properties due to leaching of calcium hydroxide is not a probable aging effect at Ginna Station and has not been observed to date. Additionally, masonry walls are used as fire barriers at Ginna Station. Masonry wall inspections are incorporated into the Structures Monitoring Program . The Structures Monitoring Program effectively manages cracking due to restraint, shrinkage and creep. Operating experience has shown that concrete has not experienced unanticipated aging effects at Ginna Station. That notwithstanding, the identification of the above aging effects by the Structures Monitoring Program , as well as the resistance provided by the materials of construction provide adequate assurance that all types of concrete aging effects will be identified and managed through out the extended period of operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(1) AIR OPERATED DAMPER HOUSING	Cast Iron	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(2) AIR OPERATED DAMPER HOUSING	Cast Iron	Containment	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(3) AIR OPERATED DAMPER HOUSING	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(4) AIR OPERATED DAMPER HOUSING	Galvanized Carbon Steel	Containment	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(5) AIR OPERATED DAMPER HOUSING	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(6) AIR OPERATED DAMPER HOUSING	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(7) BELL[1]	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(8) BLOWER CASING	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(9) BLOWER CASING	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, stainless steel exposed to ventilation air (T<140°F) would not be expected to exhibit loss of material due to pitting and crevice corrosion. Therefore no aging effects are applicable and no aging management program is required.
(10) COMPRESSOR CASING (included for conservatism)	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(11) CONDENSER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(12) CONDENSER	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(13) CONDENSER	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(14) CONDENSER	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(15) CONDENSER	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(16) CONDENSER	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(17) CONTROLLER[1]	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(18) COOLER	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(19) COOLER	Cast Iron	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(20) COOLER	Cast Iron	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(21) COOLER	Cast Iron	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(22) COOLER	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(23) COOLER	Copper Alloy (Zn < 15%)	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(24) COOLER	Copper Alloy (Zn > 15%)	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(25) COOLER	Copper Alloy (Zn > 15%)	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(26) COOLER	Stainless Steel	Concrete	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(27) COOLER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(28) COOLER	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(29) COOLER	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(30) COOLER	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(31) COOLER	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(32) COOLER	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(33) COOLING COIL	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(34) COOLING COIL	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(35) COOLING COIL	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(36) COOLING COIL	Copper Alloy (Zn < 15%)	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(37) COOLING COIL	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(38) COOLING COIL	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(39) COOLING COIL	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(40) COOLING COIL	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(41) COOLING COIL	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(42) COOLING COIL	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(43) CUTTER ASSEMBLY	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(44) CUTTER ASSEMBLY	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(45) DAMPER HOUSING/FRAME	Aluminum	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(46) DAMPER HOUSING/FRAME	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(47) DAMPER HOUSING/FRAME	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(48) DAMPER HOUSING/FRAME	Galvanized Carbon Steel	Containment	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(49) DAMPER HOUSING/FRAME	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(50) DAMPER HOUSING/FRAME	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(51) DAMPER HOUSING/FRAME	Galvanized Carbon Steel	Outdoor	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(52) DEMINERALIZER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(53) DEMINERALIZER	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(54) DEMINERALIZER	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(55) DIAPHRAGM SEAL	Neoprene	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(56) DIAPHRAGM SEAL	Neoprene	Treated Water Borated <140	Change in Material Properties and Cracking	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(57) ENGINE CASING	Carbon/Low Alloy Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(58) ENGINE CASING	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(59) EXPANSION JOINT	Flexible Asbestos Cloth	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(60) EXPANSION JOINT	Flexible Asbestos Cloth	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(61) EXPANSION JOINT	Galvanized Carbon Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(62) EXPANSION JOINT	Galvanized Carbon Steel	Air and Gas (Wetted) >140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(63) EXPANSION JOINT	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(64) EXPANSION JOINT	Neoprene	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(65) EXPANSION JOINT	Neoprene	Raw Water	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(66) EXPANSION JOINT	Rubber Coated Asbestos	Air and Gas (Wetted) <140	Change in Material Properties and Cracking	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(67) EXPANSION JOINT	Rubber Coated Asbestos	Containment	Change in Material Properties and Cracking	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(68) EXPANSION JOINT	Stainless Steel	Air and Gas (Wetted) >140	Cracking due to SCC	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(69) EXPANSION JOINT	Stainless Steel	Air and Gas (Wetted) >140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(70) EXPANSION JOINT	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(71) FAN CASING	Aluminum	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(72) FAN CASING	Aluminum	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(73) FAN CASING	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(74) FAN CASING	Aluminum	Outdoor	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(75) FAN CASING	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(76) FAN CASING	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(77) FAN CASING	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(78) FAN CASING	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(79) FASTENERS (BOLTING)	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Cracking due to SCC	Bolting Integrity Program	There are no bolts with a specified minimum yield strength > 150 ksi in this system. Therefore, SCC is not an applicable aging effect/mechanism.
(80) FASTENERS (BOLTING)	Carbon/Low Alloy Steel	Indoor (No Air Conditioning)	Loss of Preload due to Stress Relaxation	Bolting Integrity Program	Material and environment grouping are included in NUREG-1801. Aging effect of loss of preload due to stress relaxation is applicable, but is not included in Chapter V - Section E, Chapter VII - Section I, or Chapter VIII - Section H of the NUREG.
(81) FASTENERS (BOLTING)	Stainless Steel	Borated Water Leaks	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(82) FILTER HOUSING	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(83) FILTER HOUSING	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(84) FILTER HOUSING	Aluminum	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(85) FILTER HOUSING	Aluminum	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(86) FILTER HOUSING	Aluminum	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(87) FILTER HOUSING	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(88) FILTER HOUSING	Carbon/Low Alloy Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(89) FILTER HOUSING	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(90) FILTER HOUSING	Cast Iron	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(91) FILTER HOUSING	Cast Iron	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(92) FILTER HOUSING	Fiberglass Reinforced Plastic (FRP)	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(93) FILTER HOUSING	Fiberglass Reinforced Plastic (FRP)	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(94) FILTER HOUSING	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(95) FILTER HOUSING	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(96) FILTER HOUSING	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(97) FILTER HOUSING	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, stainless steel exposed to ventilation air (T<140°F) would not be expected to exhibit loss of material due to pitting and crevice corrosion. Therefore no aging effects are applicable and no aging management program is required.
(98) FILTER HOUSING	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(99) FILTER HOUSING	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(100) FILTER HOUSING	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(101) FILTER HOUSING	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(102) FILTER HOUSING	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(103) FLAME ARRESTOR	Aluminum	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(104) FLAME ARRESTOR	Aluminum	Oil and Fuel Oil	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(105) FLANGE	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(106) FLOW ELEMENT	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(107) FLOW ELEMENT	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(108) FLOW ELEMENT	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(109) FLOW ELEMENT	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(110) FLOW ELEMENT	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(111) FLOW ELEMENT	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(112) FLOW METER[1]	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(113) FLOW METER[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(114) FLOW NOZZLES	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(115) GAS CYLINDER	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(116) HAND CONTROL STATION	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(117) HAND CONTROL STATION	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(118) HAND CONTROL STATION	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(119) HEAT EXCHANGER	Carbon/Low Alloy Steel	Raw Water	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(120) HEAT EXCHANGER	Carbon/Low Alloy Steel	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Structure/component type, material, and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(121) HEAT EXCHANGER	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(122) HEAT EXCHANGER	Cast Iron	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(123) HEAT EXCHANGER	Cast Iron	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(124) HEAT EXCHANGER	Copper Alloy (Zn < 15%)	Raw Water	Loss of Material	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(125) HEAT EXCHANGER	Copper Alloy (Zn < 15%)	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(126) HEAT EXCHANGER	Copper Alloy (Zn < 15%)	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(127) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Air and Gas (Wetted) >140	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(128) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Air and Gas (Wetted) >140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(129) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Raw Water	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(130) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(131) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Treated Water Other	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(132) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(133) HEAT EXCHANGER	Copper Alloy (Zn > 15%)	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(134) HEAT EXCHANGER	HX-Copper Alloy (Zn < 15%)[2]	Raw Water	Loss of Heat Transfer	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(135) HEAT EXCHANGER	HX-Copper Alloy (Zn < 15%)[2]	Raw Water	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(136) HEAT EXCHANGER	HX-Copper Alloy (Zn < 15%)[2]	Treated Water Other	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(137) HEAT EXCHANGER	HX-Copper Alloy (Zn > 15%)[2]	Treated Water Other	Loss of Heat Transfer	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(138) HEAT EXCHANGER	HX-Copper Alloy (Zn > 15%)[2]	Treated Water Other	Loss of Heat Transfer	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(139) HEAT EXCHANGER	HX-Stainless Steel[2]	Raw Water	Loss of Heat Transfer	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(140) HEAT EXCHANGER	HX-Stainless Steel[2]	Treated Water Other	Loss of Heat Transfer	Closed-Cycle (Component) Cooling Water System Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(141) HEAT EXCHANGER	HX-Stainless Steel[2]	Treated Water Primary <140	Loss of Heat Transfer	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(142) HEAT EXCHANGER	HX-Stainless Steel[2]	Treated Water Secondary >120	Loss of Heat Transfer	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(143) HEAT EXCHANGER	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(144) HEAT EXCHANGER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(145) HEAT EXCHANGER	Stainless Steel	Raw Water	Loss of Heat Transfer	Open-Cycle Cooling (Service) Water System Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(146) HEAT EXCHANGER	Stainless Steel	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(147) HEAT EXCHANGER	Stainless Steel	Treated Water Borated <140	Loss of Heat Transfer	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(148) HEAT EXCHANGER	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(149) HEAT EXCHANGER	Stainless Steel	Treated Water Borated <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(150) HEAT EXCHANGER	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(151) HEAT EXCHANGER	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(152) HEAT EXCHANGER	Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(153) HEAT EXCHANGER	Stainless Steel	Treated Water Secondary >120	Cracking due to SCC	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(154) HEAT EXCHANGER	Stainless Steel	Treated Water Secondary >120	Loss of Material	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(155) HEATER	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(156) HEATER	Copper Alloy (Zn < 15%)	Treated Water Secondary >120	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(157) HEATING COIL	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(158) HEATING COIL	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(159) HEATING ELEMENT	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(160) HEATING ELEMENT	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(161) HEATING ELEMENT	Stainless Steel	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(162) HVAC EQUIPMENT PACKAGE[3]	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(163) HVAC EQUIPMENT PACKAGE[3]	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(164) HVAC EQUIPMENT PACKAGE[3]	Galvanized Carbon Steel	Containment	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(165) HVAC EQUIPMENT PACKAGE[3]	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(166) HVAC EQUIPMENT PACKAGE[3]	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(167) INDICATOR[1]	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(168) INDICATOR[1]	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(169) INDICATOR[1]	Copper Alloy (Zn < 15%)	Raw Water	Loss of Material	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(170) INDICATOR[1]	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(171) INDICATOR[1]	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(172) INDICATOR[1]	Plastic	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(173) INDICATOR[1]	Plastic	Oil and Fuel Oil	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(174) INDICATOR[1]	Plastic	Raw Water (Stagnant)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(175) INDICATOR[1]	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(176) INDICATOR[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(177) INDICATOR[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(178) INDICATOR[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Structure/component type, material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(179) INDICATOR[1]	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(180) LEVEL GLASS	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(181) LEVEL GLASS	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(182) LEVEL GLASS	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Consistent with NUREG-1801. Material/environment grouping and aging effect are included in NUREG-1801. The Periodic Surveillance and Preventive Maintenance Program will be used to verify the effectiveness of the Fuel Oil Chemistry Program.
(183) LEVEL GLASS	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(184) LEVEL GLASS	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(185) LEVEL GLASS	Glass	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(186) LEVEL GLASS	Glass	Oil and Fuel Oil	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(187) LEVEL GLASS	Plastic	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(188) LEVEL GLASS	Plastic	Treated Water Other	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(189) LEVEL GLASS	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(190) LEVEL GLASS	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(191) MOTOR OPERATED DAMPER	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(192) MOTOR OPERATED DAMPER	Galvanized Carbon Steel	Outdoor	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(193) MUFFLER	Galvanized Carbon Steel	Air and Gas (Wetted) >140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(194) MUFFLER	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(195) ORIFICE	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(196) ORIFICE	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(197) ORIFICE	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(198) ORIFICE	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(199) ORIFICE	Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801.
(200) ORIFICE	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(201) PENETRATION SEAL	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(202) PENETRATION SEAL	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(203) PIPE	Carbon/Low Alloy Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(204) PIPE	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(205) PIPE	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801.
(206) PIPE	Carbon/Low Alloy Steel	Treated Water Secondary >120	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801.
(207) PIPE	Cast Iron	Buried	Loss of Material	Fire Water System Program	Not consistent with NUREG-1801. The Fire Water System Program is credited for managing the effects of aging for buried cast iron piping and fittings. External surfaces of buried piping are visually examined during maintenance activities (inspections of opportunity) performed as a result of performance tests. No evidence of age-related degradation has been detected from inspections performed to date. Cast iron fire system and service water piping at Ginna Station is ductile cast iron, not gray cast iron. Ductile irons are not susceptible to loss of structural integrity due to selective leaching mechanisms, and generally display excellent resistance to general corrosion due to exposure to non-aggressive ground water. Ground water/lake water at Ginna Station is analyzed periodically and analyses performed to date confirm that the water is non-aggressive.
(208) PIPE	Cast Iron	Concrete	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(209) PIPE	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(210) PIPE	Concrete (Reinforced)	Buried	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(211) PIPE	Concrete (Reinforced)	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(212) PIPE	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(213) PIPE	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(214) PIPE	Copper Alloy (Zn < 15%)	Raw Water (Stagnant)	Loss of Material	Fire Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(215) PIPE	Copper Alloy (Zn < 15%)	Raw Water (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Consistent with NUREG-1801. Material/environment grouping and aging effect are included in NUREG-1801. The Periodic Surveillance and Preventive Maintenance Program will be used to verify the effectiveness of the Fire Water System Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(216) PIPE	Copper Alloy (Zn < 15%)	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(217) PIPE	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(218) PIPE	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(219) PIPE	Neoprene	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(220) PIPE	Neoprene	Containment	Change in Material Properties and Cracking	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(221) PIPE	Neoprene	Containment	Change in Material Properties and Cracking	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(222) PIPE	Neoprene	Containment	Change in Material Properties and Cracking	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(223) PIPE	Neoprene	Indoor (No Air Conditioning)	Change in Material Properties and Cracking	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(224) PIPE	Neoprene	Indoor (No Air Conditioning)	Change in Material Properties and Cracking	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(225) PIPE	Neoprene	Oil and Fuel Oil	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(226) PIPE	Neoprene	Raw Water	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(227) PIPE	Neoprene	Raw Water (Stagnant)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(228) PIPE	Neoprene	Treated Water Other	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(229) PIPE	Plastic	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(230) PIPE	Plastic	Raw Water Drainage	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(231) PIPE	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(232) PIPE	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(233) PIPE	Stainless Steel	Buried	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(234) PIPE	Stainless Steel	Concrete	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(235) PIPE	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(236) PIPE	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(237) PIPE	Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(238) PIPE	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(239) PIPE	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(240) PIPE	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(241) PIPE	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(242) PIPE	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(243) PIPE	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(244) PIPE	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(245) PIPE	Stainless Steel	Treated Water Primary <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(246) PIPE	Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(247) PIPE	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(248) PIPE	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(249) PIPE	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(250) PIPE	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(251) PROTOMATIC	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(252) PULSATION DAMPER	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(253) PULSATION DAMPER	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(254) PULSATION DAMPER	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(255) PUMP CASING	Aluminum	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(256) PUMP CASING	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(257) PUMP CASING	Aluminum	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(258) PUMP CASING	Aluminum	Raw Water Drainage	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(259) PUMP CASING	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(260) PUMP CASING	Cast Iron	Air and Gas (Wetted) >140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(261) PUMP CASING	Cast Iron	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(262) PUMP CASING	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(263) PUMP CASING	Cast Iron	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(264) PUMP CASING	Cast Iron	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(265) PUMP CASING	Cast Iron	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(266) PUMP CASING	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(267) PUMP CASING	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(268) PUMP CASING	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(269) PUMP CASING	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(270) PUMP CASING	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(271) PUMP CASING	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(272) PUMP CASING	Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(273) PUMP CASING	Stainless Steel	Raw Water Drainage	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(274) PUMP CASING	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. The aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG. That not withstanding, the Water Chemistry Control Program, credited for managing the aging effects for all temperatures, is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(275) PUMP CASING	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Consistent with NUREG-1801. Although the NUREG references a temperature gate of < 90°C (200°F) and a single aging effect (cracking due to SCC), materials science supports (1) a temperature gate > 140°F for cracking due to SCC, and (2) loss of material due to pitting (stagnant or low flow conditions) and crevice corrosion for all temperatures. The aging effect identified by Ginna (loss of material) for temperatures < 140°F differs from that of the NUREG. That not withstanding, the Water Chemistry Control Program, credited for managing the aging effects for all temperatures, is consistent with the NUREG and will preclude the possibility of crack initiation and growth due to SCC. A One-Time Inspection Program is also credited to verify the adequacy of the Chemistry program.
(276) RADIATION DETECTOR	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(277) RADIATION DETECTOR	Aluminum	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(278) RADIATION DETECTOR	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(279) RADIATION DETECTOR	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(280) RADIATION DETECTOR	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(281) RADIATION DETECTOR	Stainless Steel	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(282) RADIATION MONITOR SKID	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(283) RADIATION MONITOR SKID	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(284) RADIATION MONITOR SKID	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(285) RELEASE ASSEMBLY	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(286) RELEASE ASSEMBLY	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(287) RELEASE ASSEMBLY	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(288) RELEASE ASSEMBLY	Copper Alloy (Zn < 15%)	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(289) RELEASE ASSEMBLY	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(290) SCREEN	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(291) SPECIAL ELEMENT	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(292) SPECIAL ELEMENT	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(293) SPECTACLE FLANGE	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(294) SPECTACLE FLANGE	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(295) SPECTACLE FLANGE	Stainless Steel	Buried	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(296) SPECTACLE FLANGE	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(297) SPECTACLE FLANGE	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(298) SPRINKLER HEAD	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(299) STRAINER HOUSING	Carbon/Low Alloy Steel	Treated Water Secondary >120	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(300) STRAINER HOUSING	Cast Iron	Containment	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(301) STRAINER HOUSING	Cast Iron	Containment	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(302) STRAINER HOUSING	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(303) STRAINER HOUSING	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(304) STRAINER HOUSING	Copper Alloy (Zn < 15%)	Raw Water (Stagnant)	Loss of Material	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(305) STRAINER HOUSING	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(306) STRAINER HOUSING	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(307) STRAINER HOUSING	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(308) STRUCTURE	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(309) STRUCTURE	Concrete (Reinforced)	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(310) STRUCTURE	Concrete (Reinforced)	Outdoor	No Aging Effects	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(311) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Cracking/Delamination due to Movement	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(312) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Cracking/Delamination due to Shrinkage	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(313) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Cracking/Delamination due to Vibration	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(314) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Hardening and Shrinkage due to Weathering	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(315) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Loss of Material	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(316) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Separation due to Movement	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(317) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Separation due to Shrinkage	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(318) STRUCTURE	Fire Stop Materials	Indoor (No Air Conditioning)	Separation due to Vibration	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(319) STRUCTURE	Fire Wrap Materials	Indoor (No Air Conditioning)	Cracking/ Delamination due to Movement	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(320) STRUCTURE	Fire Wrap Materials	Indoor (No Air Conditioning)	Cracking/ Delamination due to Vibration	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(321) STRUCTURE	Fire Wrap Materials	Indoor (No Air Conditioning)	Loss of Material	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(322) STRUCTURE	Grout	Indoor (No Air Conditioning)	Cracking/ Delamination due to Movement	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(323) STRUCTURE	Grout	Indoor (No Air Conditioning)	Cracking/ Delamination due to Shrinkage	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(324) STRUCTURE	Grout	Indoor (No Air Conditioning)	Cracking/ Delamination due to Vibration	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(325) STRUCTURE	Grout	Indoor (No Air Conditioning)	Hardening and Shrinkage due to Weathering	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(326) STRUCTURE	Grout	Indoor (No Air Conditioning)	Loss of Material	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(327) STRUCTURE	Grout	Indoor (No Air Conditioning)	Separation due to Movement	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(328) STRUCTURE	Grout	Indoor (No Air Conditioning)	Separation due to Shrinkage	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(329) STRUCTURE	Grout	Indoor (No Air Conditioning)	Separation due to Vibration	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(330) STRUCTURE	Structural Steel - Stainless	Indoor (No Air Conditioning)	No Aging Effects	Fire Protection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(331) SWITCH[1]	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(332) SWITCH[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(333) SWITCH[1]	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(334) TANK	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(335) TANK	Carbon/Low Alloy Steel	Buried	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(336) TANK	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(337) TANK	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(338) TANK	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(339) TANK	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(340) TANK	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(341) TANK	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(342) TANK	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(343) TANK	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(344) TANK	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(345) TANK	Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(346) TANK	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(347) TANK	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(348) TANK	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(349) TANK	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(350) TANK	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(351) TANK	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(352) TANK	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(353) TEMPERATURE ELEMENT[1]	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(354) TEMPERATURE ELEMENT[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(355) TEMPERATURE ELEMENT[1]	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(356) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(357) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(358) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(359) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(360) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(361) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(362) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(363) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(364) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(365) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(366) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(367) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(368) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(369) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(370) TEMPERATURE ELEMENT[1]	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(371) TRANSMITTER[1]	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(372) TRANSMITTER[1]	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(373) TRANSMITTER[1]	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(374) TRANSMITTER[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(375) TRANSMITTER[1]	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(376) TRANSMITTER[1]	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(377) TRANSMITTER[1]	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(378) TRANSMITTER[1]	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(379) TRANSMITTER[1]	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(380) TRANSMITTER[1]	Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(381) TRANSMITTER[1]	Stainless Steel	Treated Water Primary <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(382) TRANSMITTER[1]	Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(383) TRAP HOUSING	Carbon/Low Alloy Steel	Treated Water Secondary >120	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(384) VALVE BODY	Aluminum	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(385) VALVE BODY	Aluminum	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(386) VALVE BODY	Carbon/Low Alloy Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(387) VALVE BODY	Carbon/Low Alloy Steel	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(388) VALVE BODY	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(389) VALVE BODY	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(390) VALVE BODY	Carbon/Low Alloy Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(391) VALVE BODY	Cast Austenitic Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(392) VALVE BODY	Cast Austenitic Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(393) VALVE BODY	Cast Austenitic Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(394) VALVE BODY	Cast Austenitic Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(395) VALVE BODY	Cast Austenitic Stainless Steel	Oil and Fuel Oil	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(396) VALVE BODY	Cast Austenitic Stainless Steel	Raw Water	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(397) VALVE BODY	Cast Austenitic Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(398) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(399) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(400) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(401) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(402) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(403) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(404) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(405) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(406) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(407) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(408) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(409) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(410) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(411) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(412) VALVE BODY	Cast Austenitic Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(413) VALVE BODY	Cast Iron	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(414) VALVE BODY	Cast Iron	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(415) VALVE BODY	Cast Iron	Buried	Loss of Material	Fire Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(416) VALVE BODY	Cast Iron	Containment	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(417) VALVE BODY	Cast Iron	Indoor (No Air Conditioning)	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(418) VALVE BODY	Cast Iron	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(419) VALVE BODY	Cast Iron	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(420) VALVE BODY	Cast Iron	Outdoor	Loss of Material	Systems Monitoring Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(421) VALVE BODY	Cast Iron	Raw Water	Loss of Material	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(422) VALVE BODY	Cast Iron	Raw Water (Stagnant)	Loss of Material	Open-Cycle Cooling (Service) Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(423) VALVE BODY	Cast Iron	Raw Water (Submerged)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(424) VALVE BODY	Cast Iron	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(425) VALVE BODY	Copper Alloy (Zn < 15%)	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(426) VALVE BODY	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(427) VALVE BODY	Copper Alloy (Zn < 15%)	Air and Gas (Wetted) <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(428) VALVE BODY	Copper Alloy (Zn < 15%)	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(429) VALVE BODY	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(430) VALVE BODY	Copper Alloy (Zn < 15%)	Indoor (No Air Conditioning)	No Aging Effects	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(431) VALVE BODY	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(432) VALVE BODY	Copper Alloy (Zn < 15%)	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(433) VALVE BODY	Copper Alloy (Zn < 15%)	Outdoor	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(434) VALVE BODY	Copper Alloy (Zn < 15%)	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(435) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Borated <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(436) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Other	Loss of Material	Closed-Cycle (Component) Cooling Water System Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(437) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(438) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(439) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(440) VALVE BODY	Copper Alloy (Zn < 15%)	Treated Water Secondary >120	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(441) VALVE BODY	Plastic	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(442) VALVE BODY	Plastic	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(443) VALVE BODY	Plastic	Raw Water Drainage	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(444) VALVE BODY	Stainless Steel	Air and Gas	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(445) VALVE BODY	Stainless Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(446) VALVE BODY	Stainless Steel	Containment	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(447) VALVE BODY	Stainless Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Material and environment grouping are not included in NUREG-1801.
(448) VALVE BODY	Stainless Steel	Oil and Fuel Oil	Loss of Material	Fuel Oil Chemistry Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(449) VALVE BODY	Stainless Steel	Oil and Fuel Oil	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(450) VALVE BODY	Stainless Steel	Oil and Fuel Oil	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(451) VALVE BODY	Stainless Steel	Raw Water Drainage	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(452) VALVE BODY	Stainless Steel	Treated Water Borated <140	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.
(453) VALVE BODY	Stainless Steel	Treated Water Borated <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(454) VALVE BODY	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(455) VALVE BODY	Stainless Steel	Treated Water Borated >140	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(456) VALVE BODY	Stainless Steel	Treated Water Borated >140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(457) VALVE BODY	Stainless Steel	Treated Water Borated >140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(458) VALVE BODY	Stainless Steel	Treated Water Other	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(459) VALVE BODY	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	One-Time Inspection Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation. One-time inspections are used to verify the effectiveness of the Water Chemistry Control Program.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(460) VALVE BODY	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(461) VALVE BODY	Stainless Steel	Treated Water Other (Stagnant)	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(462) VALVE BODY	Stainless Steel	Treated Water Primary <140	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(463) VALVE BODY	Stainless Steel	Treated Water Primary <140	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(464) VALVE BODY	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(465) VALVE BODY	Stainless Steel	Treated Water Primary, 140<T<480	Cracking due to SCC	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(466) VALVE BODY	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Periodic Surveillance and Preventive Maintenance Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(467) VALVE BODY	Stainless Steel	Treated Water Primary, 140<T<480	Loss of Material	Water Chemistry Control Program	Material and environment grouping are not included in NUREG-1801. The aging management program(s) referenced are appropriate for the aging effects identified and provides assurance that the aging effects are effectively managed through the period of extended operation.
(468) VENTILATION DUCTWORK	Galvanized Carbon Steel	Air and Gas (Wetted) <140	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(469) VENTILATION DUCTWORK	Galvanized Carbon Steel	Containment	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

Table 3.4-2 Auxiliary Systems - Component Types Subject to Aging Management not Evaluated in NUREG-1801

Component Types	Material	Environment	AERMs	Program/Activity	Discussion
(470) VENTILATION DUCTWORK	Galvanized Carbon Steel	Indoor (Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(471) VENTILATION DUCTWORK	Galvanized Carbon Steel	Indoor (No Air Conditioning)	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.
(472) VENTILATION DUCTWORK	Galvanized Carbon Steel	Outdoor	No Aging Effects	No Aging Management Program Required	Not consistent with NUREG-1801. According to site-specific review of standard industry guidance for aging evaluation of mechanical systems and components, galvanized carbon steel exposed to ventilation air (T<140°F) would be expected to exhibit minimal deterioration of the zinc coating. Therefore no aging effects are applicable and no aging management program is required.

1. Selected instruments were conservatively included within the scope of License Renewal. Consideration was given to the consequences of an instrument housing pressure boundary failure. Where an instrument was unisolable from a pressure source and is of sufficient size that a system function would be degraded should the pressure boundary fail, that instrument is included for License Renewal review.
2. Material prefixes with HX are used to identify heat exchanger materials which perform a heat transfer intended function in addition to the typical material usage function of pressure boundary.
3. HVAC equipment packages include the pressure boundary attributes associated with the package and sub-components such as filter housings, internal damper housings, and fan housings. Both the HVAC package units and their associated sub-components are uniquely identified on plant drawings.