LICENSE RENEWAL APPLICATION

SOUTH TEXAS PROJECT
UNIT 1 AND UNIT 2

Facility Operating License Nos.
NPF-76 and NPF-80

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CHAPTER 1

ADMINISTRATIVE INFORMATION

1.0 ADMINISTRATIVE INFORMATION

In accordance with the requirements of Part 54 of Title 10 of the Code of Federal Regulations (10 CFR Part 54), this application provides the technical and environmental information required for renewal of South Texas Project Electric Generating Station (STPEGS) Facility Operating License No. NPF-76 (Unit 1) and Facility Operating License No. NPF-80 (Unit 2) for a period of 20 years beyond the expirations of the current licenses, which occur at midnight on August 20, 2027 (Unit 1) and December 15, 2028 (Unit 2). The application also applies to renewal of the source, special nuclear, and by-product materials licenses under 10 CFR Parts 30, 40, and 70 that are included in the facility operating licenses.

The application is based on guidance provided by the U.S. Nuclear Regulatory Commission (NRC) in NUREG-1800, *Standard Review Plan (SRP) for Review of License Renewal Applications for Nuclear Power Plants*, Revision 1, September 2005; Regulatory Guide 1.188, *Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses*, Revision 1, September 2005; and guidance provided by the Nuclear Energy Institute in NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR 54 – The License Renewal Rule*, Revision 6, June 2005.

This application and supporting environmental report are intended to provide sufficient information for the NRC to complete its technical and environmental reviews and enable the NRC to make the findings required by 10 CFR 54.29 in support of the issuance of renewed operating licenses for South Texas Project (STP) Units 1 and 2.

1.1 GENERAL INFORMATION

The application meets the filing and content requirements of 10 CFR 54.17 and 10 CFR 54.19.

1.1.1 Names of Applicant and Co-Owners

STP Nuclear Operating Company (STPNOC), acting on behalf of itself and for NRG South Texas LP, the City Public Service Board of San Antonio (CPS Energy), and the City of Austin, Texas (COA), hereby applies for renewed operating licenses for STP Units 1 and 2.

STP Units 1 and 2 are currently owned by NRG South Texas LP, CPS Energy, and COA. STPNOC is authorized to act for NRG South Texas LP, CPS Energy, and COA, and has exclusive responsibility and control over the licensing, operation, maintenance, modification, decontamination, and decommissioning of the facility.

1.1.2 Addresses of Applicant and Co-Owners

STP Nuclear Operating Company
12090 FM 521
Wadsworth, TX
77483

STP Nuclear Operating Company
PO Box 289
Wadsworth, TX
77843

NRG South Texas LP
1301 McKinney St.
Suite 2300
Houston, TX
77010

CPS Energy
145 Navarro
San Antonio, TX
78205

CPS Energy
PO Box 1771
San Antonio, TX
78296

City of Austin, d/b/a, Austin Energy
721 Barton Springs Rd.
Austin, TX
78704

1.1.3 Descriptions of Business or Occupation of Applicant and Co-Owners

STP Nuclear Operating Company

Pursuant to an Operating Agreement between the co-owners of STP Units 1 and 2, STPNOC is responsible for the licensing, operation, maintenance, modification, decontamination, and decommissioning of STP Units 1 and 2, and for the construction of any additional generating units and support facilities that may be constructed at STPEGS. The co-owners are liable for payments that are chargeable to STP Units 1 and 2 in proportion to each of the co-owner's respective undivided ownership interest in STP Units 1 and 2.

NRG South Texas LP

NRG South Texas LP is a power generation company in Texas that through its parent holding companies is wholly-owned by NRG Energy, Inc. (NRG). NRG is a wholesale power generation company with a significant presence in major competitive power markets in the United States. NRG is engaged in the ownership, development, construction and operation of power generation facilities, the transacting in and trading of fuel and transportation services, and the trading of energy, capacity and related products in the United States and select international markets. As of December 31, 2007, NRG had a total global portfolio of 191 active operating generation units at 49 power generation plants, with an aggregate generation capacity of approximately 24,115 MW, and approximately 740 MW under construction which includes partners' interests. Within the United States, NRG has one of the largest and most diversified power generation portfolios in terms of geography, fuel-type and dispatch levels, with approximately 22,880 MW of generation capacity in 175 active generating units at 43 plants. These power generation facilities are primarily located in Texas (approximately 10,805 MW), the Northeast (approximately 6,980 MW), South Central (approximately 2,850 MW), and West (approximately 2,130 MW) regions of the United States, with approximately 115 MW of additional generation capacity from NRG's thermal assets.

The City Public Service Board of San Antonio

CPS Energy is a Texas municipal utility and an independent Board of the City of San Antonio. The City of San Antonio, Texas acquired its electric and gas utilities in 1942 from the American Light and Traction Company, which had been ordered by the federal government to sell properties under provisions of the Holding Company Act of 1935. Today, CPS Energy is the nation's largest municipally-owned energy utility providing both natural gas and electric service, serving more than 690,000 electric customers and approximately 322,000 natural gas customers in and around the seventh largest city in the United States. CPS Energy's 1,566 square mile service area includes Bexar County and portions of Atascosa, Bandera, Comal, Guadalupe, Medina, Wilson, and Kendall Counties. CPS Energy has earned the highest financial rating of any municipal gas and electric system in the nation.

The City of Austin, d/b/a Austin Energy, Austin, Texas

Austin Energy is the nation's 9th largest community-owned electric utility and provides service within the City of Austin, Travis County, and a small portion of Williamson County. Austin Energy, which serves more than 400,000 customers, is a department of the City of Austin, reporting to the City Manager with budget, electric rates and policy decisions set by the seven-member Austin City Council.

1.1.4 Descriptions of Organization and Management of Applicant and Co-Owners

STPNOC, NRG South Texas LP, CPS Energy, and COA are not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government.

The principal directors and officers of STPNOC, NRG South Texas LP, CPS Energy, or COA and their addresses are presented below. All persons listed are U. S. citizens, except as noted.

STP Nuclear Operating Company Board of Directors	
Name	**Address**
Edward D. Halpin (Chairman)	STPNOC P.O. Box 289 Wadsworth, TX 77483
John Ragan	NRG Energy 1301 McKinney – Suite 2300 Houston, Texas 77010
Richard Pena	CPS Energy PO Box 1771 Mail Stop 100507 145 Navarro San Antonio, TX 78296-1771
Cheryl Mele	Austin Energy 721 Barton Springs Road Austin, TX 78704

STP Nuclear Operating Company Principal Officers		
Name	**Title**	**Address**
Edward D. Halpin	President and CEO	STPNOC P.O. Box 289 Wadsworth, TX 77483
David Rencurrel	Senior Vice President, Units 1 and 2	STPNOC P.O. Box 289 Wadsworth, TX 77483
Kevin Richards	Senior Vice President	STPNOC P.O. Box 289 Wadsworth, TX ,77483
Michael Meier	Vice President and Assistant to President and CEO	STPNOC P.O. Box 289 Wadsworth, TX 77483

STP Nuclear Operating Company Principal Officers		
Name	**Title**	**Address**
G. T. Powell	Vice President, Technical Support and Oversight	STPNOC P.O. Box 289 Wadsworth, TX 77483
John Crenshaw	Vice President and Project Director, Units 3 and 4	STPNOC 4000 Ave. F, Suite A Bay City, TX 77414
Mark McBurnett	Vice President, Oversight and Regulatory Affairs Units 3 and 4	STPNOC 4000 Ave. F, Suite A Bay City, TX 77414

NRG Energy, Inc. is the ultimate parent company of NRG Generation Holdings, Inc., Texas Genco Holdings, Inc., Texas Genco GP, LLC, and NRG South Texas LP.

NRG Energy, Inc. Board of Directors	
Name	**Address**
Caldwell, Kirbyjon H.	211 Carnegie Center Princeton, NJ 08540
Chlebowski, John	211 Carnegie Center Princeton, NJ 08540
Coben, Lawrence S.	211 Carnegie Center Princeton, NJ 08540
Cosgrove, Howard E.	211 Carnegie Center Princeton, NJ 08540
Crane, David	211 Carnegie Center Princeton, NJ 08540
Cropper, Stephen L.	211 Carnegie Center Princeton, NJ 08540
Hantke, William	211 Carnegie Center Princeton, NJ 08540
Hobby, Paul	211 Carnegie Center Princeton, NJ 08540
Luterman, Gerald	211 Carnegie Center Princeton, NJ 08540

NRG Energy, Inc. Board of Directors	
Name	**Address**
McGinty, Kathleen	211 Carnegie Center Princeton, NJ 08540
Schaumburg, Anne	211 Carnegie Center Princeton, NJ 08540
Tate, Herbert T.	211 Carnegie Center Princeton, NJ 08540
Weidemeyer, Thomas	211 Carnegie Center Princeton, NJ 08540
Young, Walter	211 Carnegie Center Princeton, NJ 08540

NRG Energy, Inc. Principal Officers		
Name	**Title**	**Address**
Crane, David	President & Chief Executive Officer	211 Carnegie Center Princeton, NJ 08540
Baudier, Jeff	Senior Vice President & President, South Central Region	112 Telly St. New Roads, LA 70760
Bramnick, Michael	Senior Vice President & General Counsel	211 Carnegie Center Princeton, NJ 08540
Gutierrez, Mauricio (citizen of Mexico)	Executive Vice President & Chief Operating Officer	211 Carnegie Center Princeton, NJ 08540
Hoffmann, M. Stephen	Senior Vice President & President, West Region	1817 Aston Ave. Suite 104 Carlsbad, CA 92008
Ingoldsby, James J.	Vice President & Chief Accounting Officer	211 Carnegie Center Princeton, NJ 08540
Murphy, J. Andrew	Executive Vice President & President, Northeast Region	211 Carnegie Center Princeton, NJ 08540
Ragan, John	Executive Vice President & President, Texas Region	1301 McKinney St. Suite 2300 Houston, Texas 77010

NRG Energy, Inc. Principal Officers		
Name	**Title**	**Address**
Schade, Christian	Executive Vice President & Chief Financial Officer	211 Carnegie Center Princeton, NJ 08540
Wilson, Denise	Executive Vice President & Chief Administrative Officer	211 Carnegie Center Princeton, NJ 08540

NRG Generation Holdings, Inc. is a direct wholly-owned subsidiary of NRG Energy, Inc. and is the immediate parent company of Texas Genco Holdings, Inc.

NRG Generation Holdings, Inc. Directors and Principal Officers		
Name	**Title**	**Address**
Bramnick, Michael	Vice President	211 Carnegie Center Princeton, NJ 08540
Banskota, Arun	Vice President	1301 McKinney St. Suite 2300 Houston, TX 77010
Callaway, Catherine	Director, Vice President and Secretary	1301 McKinney St. Suite 2300 Houston, TX 77010
Ragan, John	Director and President	1301 McKinney St. Suite 2300 Houston, TX 77010
Salort, Raymond	Vice President	211 Carnegie Center Princeton, NJ 08540
Sotos, Christopher	Treasurer	211 Carnegie Center Princeton, NJ 08540

Texas Genco Holdings, Inc. is a wholly-owned subsidiary of NRG Generation Holdings, Inc. and NRG Energy, Inc. Texas Genco Holdings, Inc. is the immediate parent company of Texas Genco GP, LLC.

Texas Genco Holdings, Inc. Directors and Principal Officers		
Name	**Title**	**Address**
Bramnick, Michael	Vice President	211 Carnegie Center Princeton, NJ 08540
Banskota, Arun	Vice President	1301 McKinney St. Suite 2300 Houston, TX 77010
Callaway, Catherine	Director, Vice President and Secretary	1301 McKinney St. Suite 2300 Houston, TX 77010
Ragan, John	President and Member of Management Committee	1301 McKinney St. Suite 2300 Houston, TX 77010
Rostad, Staney E.	Vice President and Controller	1301 McKinney St. Suite 2300 Houston, TX 77010
Salort, Raymond	Vice President	211 Carnegie Center Princeton, NJ 08540
Sotos, Christopher	Treasurer	211 Carnegie Center Princeton, NJ 08540
Winn, Steve	Vice President	211 Carnegie Center Princeton, NJ 08540

Texas Genco GP, LLC is wholly owned subsidiary of Texas Genco Holdings, Inc. and is the sole general partner of NRG South Texas LP. NRG South Texas LP holds the actual interest in the South Texas Project. As a limited partnership, NRG South Texas LP does not have its own officers: the officers of Texas Genco GP, LLC perform those functions. The officers and managers of Texas Genco GP, LLC are set forth below, because they act for NRG South Texas LP.

Texas Genco GP, LLC / NRG South Texas LP Directors and Principal Officers		
Name	**Title**	**Address**
Banskota, Arun	Vice President	1301 McKinney St. Suite 2300 Houston, TX 77010
Callaway, Catherine	Director, Vice President and Secretary	1301 McKinney St. Suite 2300 Houston, TX 77010
Gutierrez, Mauricio (citizen of Mexico)	Vice President	211 Carnegie Center Princeton, NJ 08540
Lynch, Thomas	Vice President	211 Carnegie Center Princeton, NJ 08540
Poe, Don	Vice President	1301 McKinney St. Suite 2300 Houston, TX 77010
Ragan, John	President and Member of Management Committee	1301 McKinney St. Suite 2300 Houston, TX 77010
Rostad, Staney E.	Vice President and Controller	1301 McKinney St. Suite 2300 Houston, TX 77010
Salort, Raymond	Vice President	211 Carnegie Center Princeton, NJ 08540
Sotos, Christopher	Treasurer	211 Carnegie Center Princeton, NJ 08540
Von Suskil, James	Vice President	1301 McKinney St. Suite 2300 Houston, TX 77010

The City Public Service Board of San Antonio Board of Trustees	
Name	**Address**
Charles E. Foster (Chair)	CPS Energy PO Box 1771 145 Navarro San Antonio, TX 78296-1771
Derrick Howard (Vice-Chair)	CPS Energy PO Box 1771 145 Navarro San Antonio, TX 78296-1771
Stephen S. Hennigan (Trustee)	CPS Energy PO Box 1771 145 Navarro San Antonio, TX 78296-1771
Dr. Homer Guevara (Trustee)	CPS Energy PO Box 1771 145 Navarro San Antonio, TX 78296-1771
Mayor Julian Castro (Trustee and Ex-Officio Member)	CPS Energy PO Box 1771 145 Navarro San Antonio, TX 78296-1771

The City Public Service Board of San Antonio Principal Officers		
Name	**Title**	**Address**
Doyle Beneby	President and Chief Executive Officer	CPS Energy PO Box 1771 Mail Stop 101001 145 Navarro San Antonio, TX 78296-1771
Jelynne Leblanc-Burley	Executive Vice President of Corporate Support Services and Chief Administrative Officer	CPS Energy PO Box 1771 Mail Stop 101004 145 Navarro San Antonio TX 78296-1771

The City Public Service Board of San Antonio Principal Officers		
Name	**Title**	**Address**
Paula Gold-Williams	Executive Vice-President and Chief Financial Officer	CPS Energy PO Box 1771 Mail Stop 101005 145 Navarro San Antonio, TX 78296-1771
Cris Eugster	Executive Vice-President and Chief Sustainability Officer	CPS Energy PO Box 1771 Mail Stop 101007 145 Navarro San Antonio, TX 78296-1771
Carolyn E. Shellman	Executive Vice-President and General Counsel	CPS Energy PO Box 1771 Mail Stop 101011 145 Navarro San Antonio, TX 78296-1771
John Moore	Executive Vice-President of Energy Delivery Services	CPS Energy PO Box 1771 Mail Stop 101002 145 Navarro San Antonio, TX 78296-1771
Richard Pena	Senior Vice-President of Energy Development	CPS Energy PO Box 1771 Mail Stop 100507 145 Navarro San Antonio, TX 78296-1771
Michael Kotara	Senior Vice-President of Fossil Generation	CPS Energy PO Box 1771 Mail Stop 101006 145 Navarro San Antonio, TX 78296-1771
John Saenz	Senior Vice-President of Retail Energy	CPS Energy PO Box 1771 Mail Stop 101016 145 Navarro San Antonio, TX 78296-1771

The City of Austin, Texas Board of Directors (City Council serves as Board of Directors)	
Name	**Address**
Lee Leffingwell, Mayor	P.O. Box 1088 Austin, TX 78767
Mike Martinez, Mayor Pro Tem	P.O. Box 1088 Austin, TX 78767
Chris Riley, Council Member	P.O. Box 1088 Austin, TX 78767
Randi Shade, Council Member	P.O. Box 1088 Austin, TX 78767
Laura Morrison, Council Member	P.O. Box 1088 Austin, TX 78767
Bill Spelman, Council Member	P.O. Box 1088 Austin, TX 78767
Sheryl Cole, Council Member	P.O. Box 1088 Austin, TX 78767

The City of Austin, d/b/a Austin Energy, Austin, Texas COA's Principal Officers		
Name	**Title**	**Address**
Larry Weis	General Manager	721 Barton Springs Rd Austin, TX 78704
Cheryl Mele	Deputy General Manager & Operations and Chief Operating Officer	721 Barton Springs Rd Austin, TX 78704
Kerry Overton	Deputy General Manager	721 Barton Springs Rd Austin, TX 78704
Elaine Hart	Senior Vice President, Finance & Corporate Services and Chief Financial Officer	721 Barton Springs Rd Austin, TX 78704
Jackie Sargent	Senior Vice President, Power Supply & Market Operations	721 Barton Springs Rd Austin, TX 78704

The City of Austin, d/b/a Austin Energy, Austin, Texas COA's Principal Officers		
Name	**Title**	**Address**
David Wood	Vice President, Electric Service Delivery	721 Barton Springs Rd Austin, TX 78704
Karl Rabago	Vice President, Distributed Energy Services	721 Barton Springs Rd Austin, TX 78704
Jawana Gutierrez	Vice President, Customer Care	721 Barton Springs Rd Austin, TX 78704
Andrew Perny	Division Chief, Legal Services	721 Barton Springs Rd Austin, TX 78704
Pat Alba	Chief Administrative Officer	721 Barton Springs Rd Austin, TX 78704
John Baker, Jr.	Chief Strategy Officer	721 Barton Springs Rd Austin, TX 78704
Karl Popham	Acting, Chief Information Officer	721 Barton Springs Rd Austin, TX 78704

1.1.5 Class of Licenses, Use of the Facility, and Period of Time for Which the Licenses Is Sought

STPNOC requests renewal of the Class 103 operating licenses for STP Units 1 and 2 (License Nos. NPF-76 and NPF-80) for a period of 20 years beyond the expirations of the current licenses which occurs at midnight on August 20, 2027 (Unit 1) and December 15, 2028 (Unit 2).

This application also applies to renewal of those NRC source material, special nuclear material, and by-product material licenses under 10 CFR Parts 30, 40, and 70 that are subsumed or combined with the facility operating licenses.

1.1.6 Earliest and Latest Dates for Alterations, If Proposed

No physical plant alterations or modifications have been identified as necessary in order to implement the provisions of the application.

1.1.7 Restricted Data

With regard to the requirements of 10 CFR 54.17(f), this application does not contain any “Restricted Data,” as that term is defined in the Atomic Energy Act of 1954, as amended, or other defense information, and it is not expected that any such information will become involved in these licensed activities.

In accordance with the requirements of 10 CFR 54.17(g), STPNOC will not permit any individual to have access to, or any facility to possess restricted data or classified national security information until the individual and/or facility has been approved for such access under the provisions of 10 CFR 25 and/or 95.

1.1.8 Regulatory Agencies

Under the Texas Public Utility Regulatory Act (PURA), significant original jurisdiction over the rates, services, and operations of “electric utilities” is vested in the Public Utility Commission of Texas (PUCT) and in this context; “electric utility” was defined as an electric investor-owned utility. Since the electric deregulation aspects of PURA became effective on January 1, 2002, the PUCT’s jurisdiction over electric investor-owned utility (IOU) companies primarily encompasses only the transmission and distribution functions. The PUCT also has jurisdiction over a power generation company, such as NRG South Texas LP.

The PUCT has jurisdiction over the electric market in the Electric Reliability Council of Texas (ERCOT) region. That authority is focused on wholesale and retail market oversight, customer protection rules, utility (delivery) ratemaking and oversight, reliability compliance, and matters related to the transition to the competitive market, such as oversight of nuclear decommissioning trusts of existing nuclear plants in ERCOT. Traditional retail ratemaking for much of the ERCOT region has been replaced with a “customer choice” model where retail rates are established in a competitive market, subject to PUCT customer protection rules. Likewise, the wholesale electric market pricing is set by competitive processes (under the market oversight of the PUCT and a Wholesale Market Monitor selected by the PUCT), both through bilateral power agreements and as part of ERCOT ancillary service auctions. The ERCOT corporate organization serves as the IOU responsible for transmission system open access, energy scheduling and accounting, transmission control area management, system planning, and support of the competitive retail market and financial settlement of the wholesale market.

Municipal utilities, including CPS Energy, COA, and electric cooperatives have authority to acquire energy and set retail rates under their own authority and may choose to be exempt from the competitive market. PURA generally excludes municipally-owned utilities (“Municipal Utilities”), such as CPS Energy, from PUCT jurisdiction, although the PUCT has jurisdiction over electric wholesale transmission rates. Under the PURA, a municipal governing body or the body vested with the power to manage and operate a Municipal Utility such as CPS Energy has exclusive jurisdiction to set rates applicable to all services provided by the Municipal Utility with the exception of electric wholesale transmission activities and rates. Unless and until the City Council and Board choose to opt-in to electric retail competition, CPS Energy retail service electric rates are subject to appellate, but not original rate regulatory jurisdiction by the PUCT in areas that CPS Energy serves outside the San Antonio City limits. To date, no such appeal to the PUCT of CPS Energy retail electric rates has ever been filed. CPS Energy is not subject to the annual PUCT gross receipts fee payable by electric utilities.

1.1.9 Local News Publications

Trade and news publications in circulation near STP Units 1 and 2 that are considered appropriate to give reasonable notice of the application are as follows:

Bay City Tribune
2901 Carey Smith Blvd.
Bay City, TX
77414

Victoria Advocate
311 E. Constitution
Victoria, TX
77901

Matagorda Advocate
2215 Avenue G
Bay City, TX
77414

Brazosport Facts
720 S. Main
Clute, TX
77531

El Campo Leader-News
203 East Jackson St.
El Campo, TX
77437

Palacios Beacon
453 Commerce
P.O. Box 817
Palacios, TX
77465

Houston Chronicle
801 Texas Avenue
P.O. Box 4260
Houston, TX
77210-4260

Austin American Statesman
305 S. Congress Ave.
P.O. Box 670
Austin, TX
78767

San Antonio Express News
Avenue E & 3rd St.
San Antonio, TX
78205

1.1.10 Conforming Changes to Standard Indemnity Agreement

10 CFR 54.19(b) requires that License Renewal applications include, "…conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The current indemnity agreement B-108 for STP Units 1 and 2, states in Article VII that the agreement shall terminate at the time of expiration of that license specified in Item 3 of the Attachment to the agreement, which is the last to expire. Item 3 of the Attachment to the indemnity agreement, as amended, lists license numbers NPF-76, and NPF-80.

STPNOC requests that conforming changes be made to the indemnity agreement, and/or the Attachment to the agreement, as required, to ensure that the indemnity agreement continues to apply during both the terms of the current licenses and the terms of the renewed licenses. STPNOC understands that no changes may be necessary for this purpose if the current license number is retained.

1.2 GENERAL LICENSE INFORMATION

1.2.1 Application Updates, Renewed Licenses, and Renewal Term Operation

In accordance with 10 CFR 54.21(b), during NRC review of this application, an annual update to the application to reflect any change to the current licensing basis that materially affects the content of the license renewal application will be provided.

In accordance with 10 CFR 54.21(d), STPNOC will maintain a summary list in the STPEGS Updated Final Safety Analysis Report (UFSAR) of activities that are required to manage the effects of aging for the systems, structures or components within the scope of license renewal during the period of extended operation and summaries of the time-limited aging analyses evaluations.

1.2.2 Incorporation by Reference

There are no documents incorporated by reference as part of the application. Any document references, either in text or in Section 1.6 are listed for information only.

1.2.3 Contact Information

Any notices, questions, or correspondence in connection with this filing should be directed to:

Mr. G. T. Powell
Vice President Technical Support and Oversight
STP Nuclear Operating Company
P.O Box 289
Wadsworth, TX 77483

Mr. Albon W. Harrison
Manager Licensing
STP Nuclear Operating Company
P.O Box 289
Wadsworth, TX 77483

Mr. Michael J. Berg
Manager Design Engineering
STP Nuclear Operating Company
P.O Box 289
Wadsworth, TX 77483

1.3 DESCRIPTION OF THE PLANT

STP Units 1 and 2 are located in south-central Matagorda County west of the Colorado River, eight miles north-northwest of the town of Matagorda and about 89 miles southwest of Houston.

Each unit utilizes a four-loop, pressurized water reactor (PWR) Nuclear Steam Supply System (NSSS) and supporting auxiliary systems designed by Westinghouse Electric Corporation.

The rated core thermal power of each unit is 3,853 MWt. Each unit is designed for a net electrical power output of 1,250 MWe at 3.5 in. Hg abs. backpressure.

The containment structure is a post-tensioned concrete cylinder with steel liner plates, hemispherical top, and flat bottom. The cylinder portion and the hemispherical dome of the containment are prestressed by a post-tensioning system consisting of horizontal and vertical tendons.

1.4 APPLICATION STRUCTURE

This license renewal application is structured in accordance with Regulatory Guide 1.188, *Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses*, and NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule*, Revision 6. In addition, Chapter 3, Aging Management Review Results and Appendix B, Aging Management Programs, are structured to address the guidance provided in NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*. NUREG-1800 references NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*. NUREG-1801 was used to determine the adequacy of existing aging management programs and to identify existing programs that will be augmented for license renewal. The results of the aging management review, using NUREG-1801, have been documented and are illustrated in table format in Chapter 3, Aging Management Review Results, of this application.

STP Units 1 and 2 are constructed of similar materials with similar environments. Unless otherwise noted throughout this application, plant systems and structures discussed in this application apply to both Units.

The application is divided into the following chapters:

Chapter 1 – Administrative Information

This chapter provides the administrative information required by 10 CFR 54.17 and 10 CFR 54.19. It describes the plant and states the purpose for this application. Included in this chapter are the names, addresses, business descriptions, and organization and management descriptions of the applicant, as well as other administrative information. This chapter also provides an overview of the structure of the application, and a listing of acronyms and general references used throughout the application.

Chapter 2 – Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review and Implementation Results

This chapter describes and justifies the methods used in the integrated plant assessment to identify those structures and components subject to an aging management review in accordance with the requirements of 10 CFR 54.21(a)(2). These methods consist of: (1) scoping, which identifies the systems, structures, and components (SSCs) that are within the scope of 10 CFR 54.4(a), and (2) screening under 10 CFR 54.21(a)(1), which identifies those in-scope SSCs that perform intended functions without moving parts or a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period.

Additionally, the scoping results for systems and structures are described in this chapter. Scoping results are presented in Section 2.2, Table 2.2-1, STP Scoping Results. Screening results are presented in Sections 2.3, 2.4, and 2.5.

The screening results consist of lists of component types that require aging management review. Brief descriptions of mechanical systems and structures within the scope of license renewal are provided as background information. For each in-scope system and structure, component (SSC) types requiring an aging management review are identified, associated component intended functions are identified, and includes appropriate reference to the Chapter 3 Table reference providing the aging management review results.

Selected structural and electrical component types, such as component supports and cables, were evaluated as commodities. Under the commodity approach, selected structural and electrical component types were evaluated based upon common environments and materials. For each of these commodities, the component types requiring aging management are presented in Sections 2.4 and 2.5.

Chapter 3 – Aging Management Review Results

10 CFR 54.21(a)(3) requires a demonstration that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the current licensing basis throughout the period of extended operation. Chapter 3 presents the results of the aging management reviews (AMRs). Chapter 3 is the link between the scoping and screening results provided in Chapter 2 and the aging management programs (AMPs) described in Appendix B.

Aging management review results are presented in tabular form, in a format in accordance with NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*. For mechanical systems, aging management review results are provided in Sections 3.1, 3.2, 3.3, and 3.4 for the reactor vessel, internals, and reactor coolant system, engineered safety features, auxiliary systems, and steam and power conversion system. Aging management review results for containment, structures, and component supports are provided in Section 3.5. Aging management review results for electrical and instrumentation and controls are provided in Section 3.6.

Chapter 4 – Time-Limited Aging Analyses

Time-limited aging analyses (TLAAs), as defined by 10 CFR 54.3, are listed in this chapter. Chapter 4 includes each of the TLAAs identified in NUREG-1800 and in plant-specific analyses. This chapter includes a summary of the time-dependent aspects of the analyses. A demonstration is provided to show that: (1) each of the analyses remains valid for the period of extended operation, (2) the analyses have been projected to the end of the period of extended operation, or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation (PEO).

Appendix A – Updated Final Safety Analysis Report Supplement

As required by 10 CFR 54.21(d), the STPEGS UFSAR supplement is found in Appendix A. It contains a summary of activities credited for managing the effects of aging for the period of extended operation. In addition, summary descriptions and dispositions of time-limited aging analysis evaluations and a summary of license renewal commitments are provided.

Appendix B – Aging Management Programs

Appendix B describes the programs and activities that are credited for managing aging effects for components or structures during the period of extended operation based upon the aging management review results provided in Chapter 3 and the time-limited aging analyses results provided in Chapter 4.

Appendix C

Appendix C is not used.

Appendix D – Technical Specification Changes

Appendix D satisfies the requirements of 10 CFR 54.22 to identify whether any Technical Specification changes or additions are necessary to manage the effects of aging during the period of extended operation. Since no Technical Specification changes are requested, this Appendix is not used.

Appendix E – Environmental Information

This Appendix satisfies the requirements of 10 CFR 54.23 to provide a supplement to the Environmental Report that complies with the requirements of subpart A of 10 CFR 51 for STP.

1.5 ACRONYMS

Acronym	**Meaning**
AC	Alternating current
AAC	Alternate AC
ACI	American Concrete Institute
ACSR	Aluminum core, steel reinforced
AFST	Auxiliary feedwater storage tank
AFW	Auxiliary feedwater
AHU	Air handling unit
AMP	Aging management program
AMR	Aging management review
ANS	American Nuclear Society
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTs	Alternate Source Terms
ASTM	American Society for Testing Materials
ART	Adjusted reference temperature
ATWS	Anticipated transient without scram
AVB	Anti-vibration bar
BC-TOP	Bechtel topical report
BMI	Bottom-mounted instrument
BMV	Bare metal visual
BOP	Balance of plant
BTP	Branch technical position
BTRS	Boron thermal regeneration system
BWR	Boiling water reactor
CAP	Corrective action program
CASS	Cast Austenitic Stainless Steel
CBF	Cycle-based fatigue

Acronym	**Meaning**
CC	Cycle count
CCW	Component cooling water
CCWS	Component cooling water system
CETNA	Core exit thermocouple nozzle assembly
CFR	Code of Federal Regulations
CISIS	Containment in-service inspections
CLB	Current licensing basis
CMAA	Crane Manufactures Association of America
CMU	Concrete Masonry Unit
COMS	Cold over pressurization mitigation system
CRs	Condition reports
CR	Control Room
CRDM	Control rod drive mechanism
CRGT	Control rod guide tube
CUF	Cumulative usage factor
CVCS	Chemical and volume control system
CWIS	Circulating water intake structure
DBA	Design basis accident
DBE	Design basis event
DC	Direct current
DG	Diesel generator
DGB	Diesel generator building
EAB	Electrical auxiliary building
EAF	Environmental-assisted fatigue
ECCS	Emergency core cooling system
ECP	Essential cooling water pond
ECW	Essential cooling water
ECWIS	Essential cooling water intake structure
EFPY	Effective full power year
EOC	End-of-cycle

Acronym	Meaning
EOL	End-of-license
EOLE	End-of-license-extended
EPRI	Electric Power Research Institute
EQCP	Environmental qualification checklist package
EQDF	Environmental qualification data file
EQ	Environmental qualification
ERCOT	Electric Reliability Council of Texas
ESF	Engineered safety features
FAC	Flow-accelerated corrosion
FCG	Fatigue crack growth
FHB	Fuel handling building
FWIV	Feedwater isolation valve
GALL	Generic Aging Lessons Learned
GDC	General Design Criteria
GSI	Generic Safety Issue
HAZ	Heat affected zone
HELB	High energy line break
HEPA	High-efficiency particulate air
HHSI	High-head safety injection
HSS	High safety significance
HVAC	Heating, ventilation, and air conditioning
I&C	Instrument and controls
IASCC	Irradiation-assisted stress corrosion cracking
ICI	In-core instrumentation
ICSA	In-containment storage area
IDDs	Internal disconnect devices
IEEE	Institute of Electrical and Electronics Engineers
IGSCC	Intergranular stress corrosion cracking
IOU	Investor-owned utility
INPO	Institute for Nuclear Power Operations

Acronym	Meaning
IPA	Integrated plant assessment
IR	Insulation resistance
ISG	Interim staff guidance
ISI	Inservice Inspection
LBB	Leak-before-break
LCO	Limiting condition for operation
LERs	License evaluation reports
LOCA	Loss of coolant accident
LR	License renewal
LRA	License renewal application
LSRS	Low safety risk significant
LSS	Low safety significance
LTOP	Low-temperature overpressure protection
MAB	Mechanical auxiliary building
MC	Metal containment
MCC	Motor control center
MEAB	Mechanical-electrical auxiliary building
MEB	Metal enclosed bus
MED	Master equipment database
MIC	Microbiologically influenced corrosion
MOPs	Modified operating procedures
MRV	Minimum required value
MSIV	Main steam isolation valve
MSLB	Main steam line break
MSR	Moisture separator reheater
MSS	Medium safety significance
MWe	Megawatt electric
MWt	Megawatt thermal
NDE	Nondestructive examination
NEI	Nuclear Energy Institute

Acronym	Meaning
NFPA	National Fire Protection Association
NNS	Non nuclear-safety
NP	Not projected
NPS	Nominal pipe size
NRS	Non-risk significant
NRC	Nuclear Regulatory Commission
NSSS	Nuclear steam supply system
NUMARC	Nuclear Management and Resource Council
OBE	Operating base earthquake
OCCW	Open cycle cooling water
OE	Operating experience
OSHA	Occupational Safety and Health Administration
OSS	Out-of-specification
OTI	One-time inspection
OWTF	Oily Wash Treatment Facility
PASS	Post accident sample system
PEO	Period of extended operation
P&ID	Piping and instrument diagram
PI	Project instruction
PORV	Power operated relief valve
P-T	Pressure-temperature
PTS	Pressurized thermal shock
PUCT	Public Utility Commission of Texas
PURA	Public Utility Regulatory Act
PVC	Polyvinyl chloride
PWR	Pressurized water reactor
PWSCC	Primary water stress corrosion cracking
PZR	Pressurizer
QA	Quality Assurance
RCCA	Rod cluster control assembly

Acronym	Meaning
RCCAs	Rod cluster control assemblies
RCFC	Reactor containment fan cooler
RCB	Reactor containment building
RCP	Reactor coolant pump
RCPB	Reactor coolant pressure boundary
RCS	Reactor coolant system
RG	Regulatory Guide
RHR	Residual heat removal
RIS	Regulatory Information Summary
RMPF	Reservoir Makup Pump Facility
RPV	Reactor pressure vessel
RRVCH	Replacement reactor vessel closure head
RSG	Replacement steam generator
RT	Reference temperature
RV	Reactor vessel
RVI	Reactor vessel and internals
RVWLIS	Reactor vessel water level indication system
RWST	Refueling water storage tank
SAMA	Severe accident mitigation alternates
SBO	Station blackout
SC	Safety class
SCC	Stress corrosion cracking
SDG	Standby diesel generator
SE	Safety evaluation
SER	Safety evaluation report
SFPCCS	Spent fuel pool cooling and cleanup system
SSE	Safe shutdown earthquake
SSER	Supplemental safety evaluation report
SG	steam generator
SIS	Safety injection system

Acronym	Meaning
SIT	Structural integrity test
SMP	Structures monitoring program
SRP	Standard Review Plan
SS	Stainless steal
SSCs	Systems, structures, and components
SSE	Safe shutdown earthquake
SSTR	Scoping and Screening Technical Report
STP	South Texas Project
STPEGS	South Texas Project Electric Generating Station
STPNOC	South Texas Project Nuclear Operating Company
SWOL	Structural weld overlay
TGB	Turbine-generator building
TLAA	Time-limited aging analyses
TS	Technical Specifications
TSC	Technical support center
TSP	Trisodium phosphate
TTA	Tolyltriazole
UCS	Upper core support
UFSAR	Updated Final Safety Analysis Report
USE	Upper-shelf energy
VCT	Volume control tank
VE	Visual Exam
WCAP	Westinghouse Commercial Atomic Power
WOG	Westinghouse Owners Group

1.6 GENERAL REFERENCES

1. 10 CFR 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*.

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

3. Regulatory Guide 1.188, *Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses*, Revision 1, September 2005.

4. NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*, United States Nuclear Regulatory Commission, Revision 1 – September 2005.

5. NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, United States Nuclear Regulatory Commission, Revision 1 – September 2005.

6. 10 CFR 50.48, *Fire Protection*.

7. 10 CFR 50.49, *Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants*.

8. 10 CFR 50.62, *Requirements for Reduction of Risk from Anticipated Transients without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants*.

9. 10 CFR 50.61, *Pressurized Thermal Shock.*

10. 10 CFR 50.63, *Loss of All Alternating Current Power*.

11. 10 CFR 50.65, *Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*.

12. 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants*.

13. 10 CFR 51, *Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions*.

CHAPTER 2

SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW AND IMPLEMENTATION RESULTS

2.0 SCOPING AND SCREENING METHODOLOGY FOR IDENTIFYING STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW AND IMPLEMENTATION RESULTS

Chapter 2 provides the following information that is required by 10 CFR Part 54, *The License Renewal Rule*, Regulatory Guide 1.188, *Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses* and NUREG-1800, *Standard Review Plan (SRP) for Review of License Renewal Applications for Nuclear Power Plants*:

- Scoping and Screening Methodology (Section 2.1)
- Plant-Level Scoping Results (Section 2.2)
- Scoping and Screening Results: Mechanical Systems (Section 2.3)
- Scoping and Screening Results: Structures (Section 2.4)
- Scoping and Screening Results: Electrical and Instrumentation and Controls Systems (Section 2.5)

2.1 SCOPING AND SCREENING METHODOLOGY

The scope of plant systems, structures and components (SSCs) subject to license renewal is defined in 10 CFR 54.4(a). For SSCs within the scope of license renewal, 10 CFR 54.21(a)(1) requires the license renewal applicant to perform an integrated plant assessment (IPA) to identify and list the structures and components subject to an aging management review (AMR). 10 CFR 54.21(a)(2) further requires that the methods used to implement the requirements of 10 CFR 54.21(a)(1) be described and justified.

This section of the application provides a description of the methodology and bases used to identify and list structures and components at STP that are within the scope of license renewal and subject to an AMR.

STP Units 1 and 2 are constructed of similar materials with similar environments. Therefore, the system and component information presented in this application typically applies to both units unless otherwise noted.

2.1.1 Introduction

The first step in the IPA process identified the plant SSCs within the scope of 10 CFR 54. This step is called scoping. For those SSCs identified to be within the scope of the license renewal rule, the second step of the IPA process then identified and listed the structures and components that are subject to an AMR. This step of the process is called screening.

The scoping and screening steps have been performed in compliance with the requirements of 10 CFR 54, and are consistent with the expectations set forth in the Statements of Consideration supporting the license renewal rule, and the guidance provided in NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule*. Section 2.1.1.1 provides a discussion of the documentation used to perform scoping and screening.

Section 2.1.2 discusses the application of the 10 CFR 54.4(a) scoping criteria. Section 2.1.3 describes the scoping methodology. Section 2.1.4 describes the screening methodology. The NRC staff's license renewal interim staff guidance (LR-ISG) documents were considered as described in Section 2.1.5. Section 2.1.6 describes the evaluation of NRC Generic Safety Issues (GSI), and Section 2.1.7 provides conclusions.

An overview of the Scoping and Screening Process is presented in Figure 2.1-1, Scoping and Screening Process Flow.

2.1.1.1 Documentation Sources Used for Scoping and Screening

Various documentation sources were used during the scoping and screening process. These documentation sources are listed below and described in the following sections.

- Current licensing basis (CLB) documents
- Engineering drawings
- Technical position papers
- Master equipment database
- Q-List

2.1.1.1.1 Current Licensing Basis Documents

The CLB is defined in 10 CFR 54.3. A variety of CLB documents were used to confirm or to determine additional SSC functions and evaluate them against the criteria of 10 CFR 54.4(a). These document types are:

- STP Updated Final Safety Analysis Report (UFSAR)
- Safety Evaluation Reports (SERs)
- Technical Specifications
- Licensing correspondence reflecting STPNOC commitments related to various SSCs and programs

2.1.1.1.2 Engineering Drawings

Engineering drawings that provide layout and configuration details were reviewed for systems and structures. This included electrical, mechanical, and structural drawings. Use of engineering drawings is discussed in Sections 2.1.3.1, 2.1.3.2, and 2.1.3.3.

2.1.1.1.3 Technical Position Papers

The CLB was reviewed and technical position papers were prepared to use as guidance as part of the preparation for the license renewal application to support scoping evaluations.

The following license renewal position papers relating to scoping and screening methodology were prepared:

- Anticipated Transients Without Scram
- Station Blackout
- Fire Protection
- Environmental Qualification
- Pressurized Thermal Shock
- Criterion (a)(2)
- Electrical/I&C Plant Spaces Approach
- Plant Systems and Aging Management Programs
- Thermal Insulation
- Design Basis Events

2.1.1.1.4 Master Equipment Database

STP maintains a controlled master equipment database (MED) of design, configuration, and reference information for plant components and equipment, which are used in or support design, maintenance, surveillance, equipment clearance orders or work instruction activities. The master equipment database provides the design and quality classification for each component.

2.1.1.1.5 Q-List

STP maintains the quality classification of structures, systems and components as part of the MED for STP Units 1 and 2. The MED quality classification was used to verify the design and quality class of SSCs.

2.1.2 Scoping Criteria

SSCs that satisfy the criteria in 10 CFR 54.4(a)(1), (a)(2) or (a)(3) are within the scope of license renewal. Specifically, 10 CFR 54.4 states:

> *(a) Plant systems, structures, and components within the scope of this part are-*
>
> > *(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions-*
> >
> > > *(i) The integrity of the reactor coolant pressure boundary;*

(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or

(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable.

(2) All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1) (i), (ii), or (iii) of this section.

(3) All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

(b) The intended functions that these systems, structures, and components must be shown to fulfill in §54.21 are those functions that are the bases for including them within the scope of license renewal as specified in paragraphs (a)(1) – (3) of this section.

The application of each of these criteria to plant SSCs is discussed in Section 2.1.2.1, Section 2.1.2.2, and Section 2.1.2.3, respectively.

2.1.2.1 10 CFR 54.4(a)(1) – Safety-related

10 CFR 54.4(a)(1) requires that plant SSCs within the scope of license renewal include safety-related SSCs which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions:

(i) The integrity of the reactor coolant pressure boundary;

(ii) The capability to shutdown the reactor and maintain it in a safe shutdown condition; or,

(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposure comparable to those referred to in 50.34(a)(1), 50.67(b)(2), or 100.11, as applicable.

STP Safety-related Classifications

Safety-related design classifications for systems, structures, and components are described in the UFSAR and in plant specification *Quality Classification of Structures, Systems and Components*. Safety-related classifications for components are documented on engineering drawings and in the master equipment database. The safety-related classification as described in these source documents was used to identify SSCs satisfying one or more of the criteria of 10 CFR 54.4(a)(1) and include them within the scope of license renewal.

STP-specific definitions for safety-related in UFSAR Section 3.2 are consistent with the definition of safety-related provided in 10 CFR 54.4(a)(1).

UFSAR Section 3.2.A states that certain structures, components, and systems of the nuclear plant are considered safety-related because they perform safety functions required to prevent or mitigate the consequences of abnormal operational transients or accidents. Safety-related plant structures, systems, and components are designed to withstand the effects of a Safe Shutdown Earthquake (SSE) and remain functional if they are necessary to assure:

1. The integrity of the reactor coolant pressure boundary (RCPB).

2. The capability to shut down the reactor and maintain it in a safe shutdown condition.

3. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100.

UFSAR Section 3.2.B states that for nuclear steam supply system SSCs, Westinghouse Electric Corporation, in lieu of the requirements of RG 1.26 and 1.29, applies a rule that each component classified as safety class (SC) 1, 2, or 3 shall be qualified to remain functional in the event of the SSE except where exempted by meeting all of the following conditions. Portions of systems required to perform the same safety function required of any SC component, which is a part of that system shall be likewise qualified or granted exemption.

Provisions to be met for exemption are:

1. Failure would not directly cause a Condition III or IV event (as defined in UFSAR Reference 3.2.B-4).

2. There is no safety function to perform nor could failure prevent mitigation of the consequences of a Condition III or IV event.

3. Failure during or following any Condition II event would result in consequences no more severe than allowed for a Condition III event.

Quality group classification, safety class terminology is utilized for the classification of components and structures. This terminology correlates to the NRC Quality Group designations for water, steam, and radioactive waste-containing mechanical components as follows:

STP Classification	NRC RG 1.26
SC 1	Quality Group A
SC 2	Quality Group B
SC 3	Quality Group C
NNS	(Non-Nuclear Safety) Quality Group D

Components and structures with quality group classifications SC1, SC2 and SC3 are within the scope of license renewal for (a)(1).

Design Basis Events

The STP UFSAR and procedures governing safety-related and important to safety design classifications refer to “design basis events” (DBEs) while 10 CFR 54.4(a)(1) is more specific referring to design basis events as defined in 10 CFR 50.49(b)(1). DBEs are defined in 10 CFR 50.49(b)(1) as conditions of normal operation, including anticipated operational occurrences, design basis accidents, external events, and natural phenomena for which the plant must be designed to ensure the functions based on 10 CFR 54.4(a)(1). As part of the scoping methodology, a position paper was prepared to confirm that all applicable design basis events were considered. The UFSAR identifies the design basis events for STP.

STP conducted a search for DBEs to be considered during the scoping process. UFSAR Chapter 15 is the main source of the STP DBEs. Non-Chapter 15 events included natural phenomena and external events described in UFSAR Chapter 2, and design basis events, natural phenomena, and external events associated with the design of structures in UFSAR Chapter 3. DBEs were also identified within other UFSAR chapters. The STP UFSAR review identified the set of DBEs and confirmed that the license renewal process had evaluated the associated SSCs consistent with the criteria of the Rule.

Safety-related Components Located in Turbine Building

The following components located in the turbine building are classified safety-related:

- Bypass system stop valve closure limit switches
- ATWS turbine trip fluid pressure switches

- Feedwater regulating control valve's air solenoid valves and limit switches

Bypass system stop valve closure limit switches

The turbine bypass system is controlled by the steam dump control system and permits the nuclear plant to accept a sudden loss of load without incurring a reactor trip. Failure of these stop valve closure limit switches could cause the steam dump valves not to open following a large loss of load. This would cause the steam generator safety valves to lift and the reactor will would be tripped by the safety-related pressurizer high pressure signal. While these limit switches are conservatively classified safety-related, UFSAR Sections 10.4.4.2 and 15.2.2.1 state that the turbine bypass system "is not required for any safety function, but it is included to provide operational flexibility and to minimize steam relief to the atmosphere." These turbine bypass system stop valve closure limit switches are conservatively scoped within the scope of license renewal but have no safety-related intended functions therefore the provisions of criterion 10 CFR 54.4(a)(2) do not apply.

ATWS turbine trip fluid pressure switches

The ATWS turbine trip fluid pressure switches initiate a reactor trip on turbine trip. A failure of these switches would not prevent a turbine trip due to the fail-safe condition of relays, and the turbine is provided with a mechanical overspeed trip device as backup. A turbine trip without a reactor trip would cause a loss of feed water flow, which would initiate a reactor trip on low steam generator water level. The probability of an ATWS event is very low and its occurrence would require multiple failures. UFSAR Section 7.2.1.1.3 item 6 states that "the reactor trip on turbine trip provides additional protection and conservatism beyond that required for the health and safety of the public. This trip is included as part of good engineering practice and prudent design. No credit for this trip is taken in any of the safety analyses (UFSAR Section 15.0.6)." These turbine trip pressure switches are conservatively classified as safety-related and are within the scope of license renewal for criteria 10 CFR 54.4(a)(3) but have no safety-related intended functions therefore the provisions of criterion 10 CFR 54.4(a)(2) do not apply.

Feedwater regulating control valve's air solenoid valves and limit switches

The nonsafety-related feedwater regulating control valves provide backup isolation to the safety-related feedwater isolation valves preventing or mitigating the effects of excessive feedwater flow that could results in excessive reactor cooldown. The feedwater regulating control valve's air solenoid valves and limit switches are safety-related and are within the scope of license renewal for criteria 10 CFR 54.4, (a)(1). The nonsafety-related feedwater regulating control valves are within the scope of license renewal for criterion 10 CFR 54.4, (a)(2). The nonsafety-related piping and structures that could potentially interact with these safety-related solenoid valves and limit switches are within the scope of license renewal for criterion (a)(2).

Exposure Guidelines

The exposure guidelines used for STP license renewal are the same as 10 CFR 54.4. In addition to the guidelines of 10 CFR 100, 10 CFR 54.4(a)(1)(iii) references the dose guidelines of 10 CFR 50.34(a)(1) and 10 CFR 50.67(b)(2). These different exposure guidelines appear in three different Code sections to address similar accident analyses performed by licensees for different reasons. The exposure guidelines of 10 CFR 50.34(a)(1) are applicable to applicants for a construction permit, a design certification or combined license pursuant to 10 CFR 52 and does not apply to STP license renewal. The exposure guidelines of 10 CFR 50.67(b) address the use of alternate source terms (ASTs) and are applicable under the STP CLB for the Electrical Auxiliary Building and Control Room HVAC system, as a result of a locked-rotor accident and for the steam-generator tube rupture analysis with a failed-open main steam isolation valve. A review of CLB documents pertaining to the limited use of ASTs was performed to ensure that any applicable SSCs were included within the scope of license renewal. Therefore, use of the STP safety-related design classification designators is consistent with 10 CFR 54.4(a)(1) scoping criteria.

2.1.2.2 10 CFR 54.4(a)(2) – Nonsafety-Related Affecting Safety-Related

10 CFR 54.4(a)(2) requires that plant SSCs within the scope of license renewal include all nonsafety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for safety-related SSCs. The guidance provided in NEI 95-10, Appendix F was used to develop the methodology for scoping to the criterion of 10 CFR 54.4(a)(2).

The methodology includes identification of nonsafety-related SSCs that are connected to safety-related SSCs and nonsafety-related SSCs that could spatially interact with safety-related SSCs. Determination and identification of any other SSCs satisfying criterion 10 CFR 54.4(a)(2) was completed as described below based on review of applicable CLB documents, plant specific and industry operating experience, and by system and structure functional evaluations.

Nonsafety-Related SSCs Performing Safety-Related 10 CFR 54.4(a)(1) Functions

The STP UFSAR and other current licensing basis documents were reviewed for nonsafety-related plant systems or structures, to determine whether nonsafety-related systems or structures were credited with performing a safety-related function. STP does not have nonsafety-related systems or structures credited in CLB documents that perform a safety-related function.

Nonsafety-Related SSCs Directly Connected to Safety-Related SSCs

Nonsafety-related SSCs that are directly connected to safety-related SSCs were included within the scope of license renewal to ensure structural integrity of the safety-related SSC up to the first seismic anchor or equivalent anchor past the safety/nonsafety interface.

Seismic anchors and equivalent anchors were identified following the guidance of NEI 95-10, Appendix F as discussed below:

- A seismic anchor that ensures that forces and moments are restrained in three orthogonal directions.

- An equivalent anchor that is defined in the CLB.

- An equivalent anchor that consists of a large piece of plant equipment or a series of supports that are part of a plant-specific piping design analysis. The large piece of equipment that serves as the anchor is in the scope of license renewal or the nonsafety-related piping up to the last orthogonal support is in the scope of license renewal.

- An equivalent anchor that is composed of a combination of restraints or supports attached to the nonsafety-related piping that encompasses at least two supports in each of the three orthogonal directions. The nonsafety-related piping up to the last orthogonal support is in the scope of license renewal.

In cases where seismic or equivalent anchors were not available to serve as the license renewal boundary, the following methods as provided for in NEI 95-10, Appendix F, were utilized to establish the license renewal boundary:

- A base-mounted component (e.g., pump, heat exchanger, tank, etc.) that is a rugged component and is designed not to impose loads on connecting piping was included in scope as it has a support function for the safety-related piping. The base-mounted equipment that serves as the equivalent anchor is in the scope of license renewal.

- A flexible connection that was considered a pipe stress analysis model end point, when the flexible connection effectively decouples the piping system (i.e., does not support loads or transfer loads across it to connected piping).

- A free end of nonsafety-related piping, such as a drain pipe that ends at an open floor drain.

- Nonsafety-related piping runs that are connected at both ends to safety-related piping. The entire run of nonsafety-related piping between the safety-related piping is in the scope of license renewal if no seismic anchors or equivalent anchors are available.

- A point where buried piping exits the ground. The buried portion of the piping is included in the scope of license renewal.

- A smaller branch line where the moment of inertia ratio of the larger piping to the smaller piping is such that the smaller branch line does not impose loads on the larger piping and does not support the larger piping.

Nonsafety-Related SSCs with Interaction with Safety-Related SSCs

In accordance with NEI 95-10, Appendix F, STP applied the preventative option for 10 CFR 54.4(a)(2) scoping. The preventative option is based on scoping nonsafety-related SSCs within the scope of license renewal, which have a structural integrity (attached) and/or leakage boundary (spatial) interaction with safety-related SSCs.

Nonsafety-related SSCs, which are connected to safety-related piping such that their potential failure could adversely impact the performance of the intended function of a safety-related SSC, are included within the scope of license renewal for structural integrity (attached) under criterion 10 CFR 54.4(a)(2).

Nonsafety-related SSCs that contain fluid or steam, and are located in the same room or areas that contain safety-related SSCs are included in scope for potential leakage boundary (spatial) interaction under criterion 10 CFR 54.4(a)(2) (regardless of the system pressure). The rooms and areas of concern for potential leakage boundary (spatial) interaction were identified based on a review of the CLB and design drawings and considered for potential communication with other rooms that may contain 10 CFR 54.4(a)(1) components. Plant walk downs were performed, as necessary, to confirm the spatial interaction boundaries.

Nonsafety-related components located in the reactor containment building that contain fluid or steam are included within the scope of license renewal under criterion 10 CFR 54.4(a)(2) regardless of the system pressure.

The potential effects of flooding as a consequence of a pipe break or critical crack were reviewed to ensure that the operability of safety-related equipment would not be impaired. Nonsafety-related pipes that could fail and impair the operability of safety-related equipment are within the scope of license renewal for criterion 10 CFR 54.4(a)(2). Floor drains and curbs required for flood mitigation are within the scope of license renewal based on 10 CFR 54.4(a)(2).

Piping that contains air and gas (non-liquid) is not a hazard to other plant equipment, and has been determined not to have spatial interactions with safety-related SSCs. STP and industry operating experience has not identified failures due to aging that have adversely affected the accomplishment of a safety function. SSCs containing air or gas cannot adversely affect safety-related SSCs due to leakage or spray, since gas systems contain no fluids that could spray or leak onto safety-related systems causing shorts or other malfunctions. Gas systems do not contain sufficient energy to cause pipe whip or jet impingement. The nonsafety-related piping systems containing air or gas (except portions attached to safety-related SSCs and required for structural integrity) are not included within the scope of license renewal for criterion 10 CFR 54.4(a)(2) for spatial interaction.

Supports for nonsafety-related SSCs are included in scope to prevent adverse interaction with safety-related SSCs.

2.1.2.3 10 CFR 54.4(a)(3) – Regulated Events

10 CFR 54.4(a)(3) requires that plant SSCs within the scope of license renewal include all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for fire protection (10 CFR 50.48), EQ (10 CFR 50.49), PTS (10 CFR 50.61), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63).

Position papers were prepared to provide input to the scoping process. The purpose of these position papers was to evaluate the STP CLB relative to the regulated events, identify the systems and structures that are relied upon to demonstrate compliance with each of these regulations, and document the results of this review. Guidance provided by the position papers was used during system and structure scoping to identify system and structure intended functions for Criterion (a)(3), and again during component scoping as necessary to determine which components are credited in the regulated events. SSCs credited in the regulated events have been classified as satisfying criterion 10 CFR 54.4(a)(3) and have been identified as within the scope of license renewal.

2.1.2.3.1 Fire Protection

The STP CLB for Fire Protection consists of 10 CFR 50.48 (a), 10 CFR 50 Appendix A General Design Criteria (GDC) 3, STPEGS Operating License, Condition 2.E, NUREG-0781, SER and SSERs 2, 3, 4, 5, and 7, UFSAR 9.5.1, and Fire Hazards Analysis Report.

These documents identify the features required for STP to demonstrate compliance with 10 CFR 50.48 as described in the SER and supplements.

10 CFR 50.48 (a) requires that operating nuclear power plants have a fire protection plan that satisfies GDC 3 of 10 CFR 50 Appendix A. 10 CFR 50.48(b) allows the use of provisions of Appendix A to BTP APCSB 9.5-1 as an alternative to the requirements of Appendix R provided those provisions have been accepted by the NRC.

STPNOC received a low power operating license on August 21, 1987 for Unit 1 and on December 16, 1988 for Unit 2. The full power operation license for Unit 1 was issued on March 22, 1988 and for Unit 2 on March 28, 1989.

The NRC used the technical requirements of Appendix R to 10 CFR 50 and Appendix A to BTP APCSB 9.5-1 as guidelines in its evaluation of the STP fire protection program.

The additional details of fire protection requirements are provided in UFSAR Section 9.5.1 and the Fire Hazards Analysis Report.

SSCs classified as satisfying criterion 10 CFR 54.4(a)(3) related to fire protection are identified as within the scope of license renewal.

2.1.2.3.2 Environmental Qualification

Criterion 10 CFR 54.4(a)(3) requires that all SSCs relied on in safety analyses or regulations for EQ (10 CFR 50.49) are included within the scope of license renewal.

UFSAR Section 3.11.2 states that safety-related equipment and components located in a harsh environment are qualified by test or combination of test and analysis in accordance with the requirements of 10 CFR 50.49 and NUREG-0588.

Components within the scope of the STP EQ program which demonstrate compliance with 10 CFR 50.49 and the systems containing those components are classified as satisfying criterion 10 CFR 54.4(a)(3) and are identified as within the scope of license renewal.

EQ is a time-limited aging analysis (TLAA) as defined by 10 CFR 54.3(a) and is addressed in Section 4.4.

2.1.2.3.3 Pressurized Thermal Shock

Criterion 10 CFR 54.4(a)(3) requires that plant SSCs within the scope of license renewal include all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for PTS (10 CFR 50.61).

A position paper was developed to review the licensing basis for pressurized thermal shock at STP. The only component within the scope of the license renewal rule for pressurized thermal shock is the reactor pressure vessel.

The calculation of nil-ductility transition reference temperature RT_{PTS} is a time-limited aging analysis (TLAA) as defined by 10 CFR 54.3(a) and is addressed in Section 4.2.

2.1.2.3.4 Anticipated Transients without Scram

Criterion 10 CFR 54.4(a)(3) requires that plant SSCs within the scope of license renewal include all SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for ATWS (10 CFR 50.62). An ATWS is a postulated operational transient that generates an automatic scram signal accompanied by a failure of the reactor protection system to shutdown the reactor.

The ATWS Rule required improvements in the design to reduce the probability of failure to shutdown the reactor following anticipated transients, and to mitigate the consequences of an ATWS event. Each pressurized water reactor was required to have equipment from sensor output to final actuation device, which is diverse from the reactor trip system, to automatically initiate the auxiliary feedwater system and initiate a turbine trip under conditions indicative of ATWS. This equipment is designed to perform its function in a reliable manner and be independent (from sensor output to the final actuation device) from the existing reactor trip system.

10 CFR 50.62 requires Westinghouse designed plants to install an ATWS mitigation system actuation circuitry to initiate a turbine trip and actuate the auxiliary feedwater flow independent of the reactor protection system (from the sensor output). With the installation of Delta 94 steam generators, the actuation signal was changed from feedwater flow to steam generator water narrow range level.

ATWS equipment required by 10 CFR50.62 is described in UFSAR Section 7.8, ATWS Mitigation System Actuation Circuitry.

ATWS SSCs are within the scope of license renewal.

2.1.2.3.5 Station Blackout

Criterion 10 CFR 54.4(a)(3) requires that plant SSCs within the scope of license renewal include all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations for SBO (10 CFR 50.63).

STPNOC provided the NRC with its original response to the SBO Rule in correspondence dated April 17, 1989. The NRC issued its initial Safety Evaluation on July 17, 1991. On July 28, 1994, a STP self-assessment determined that the STP units were not fully meeting the requirements of the SBO Rule. On August 1, 1994 STPNOC prepared a justification for continued operation which implemented the 73 miles per hour hurricane shutdown criterion, reduced the coping duration from 8 hours to 4 hours, and eliminated crediting the auxiliary ESF transformers for SBO coping. On March 1, 1995 STP provided the NRC a revised position to the SBO Rule. The NRC issued a Safety Evaluation Report for the Revised Station Blackout Position on July 24, 1995.

UFSAR Section 8.3.4 discusses SBO coping duration, alternate AC power source, condensate inventory for decay heat removal, class 1E battery capacity, compressed air requirements, effect of loss of ventilation, containment isolation, reactor coolant inventory and quality assurance program requirements.

The STP SBO analysis was performed using the guidance provided in NUMARC 87-00, Rev. 0 and the coping time (the postulated maximum SBO duration) was determined to be four hours. The STP SBO position credits any one of the three standby diesel generators as the AAC source. Each standby diesel generator can energize an independent train of auxiliary feedwater, essential cooling water, component cooling water, steam generator power operated relief valves, high head safety injection, and

EAB/Control Room HVAC. Each standby diesel generator meets or exceeds the NUMARC 87-00, Appendix B, criteria for capacity, capability and connectability.

STP's offsite power system is in accordance with GDC 17 and provides two separate paths of power from the transmission system to the ESF buses as shown on Figure 2.1-2. Recovery from an SBO focuses on restoration of an AC power source. This can be from the onsite diesel generators, or from an offsite source. STP has the following paths of offsite power.

- 345 kV switchyard to main and unit auxiliary transformers
- 345 kV switchyard to standby transformer 1
- 345 kV switchyard to standby transformer 2

The main and unit auxiliary transformers are connected to the switchyard through disconnect G019 (Unit 1), and G029 (Unit 2) which connects to the switchyard via switchyard circuit breakers Y510 and Y520 (Unit 1), and Y590 and Y600 (Unit 2). The unit auxiliary transformer, the iso-phase bus, the main transformer, the overhead transmission lines, the switchyard breakers and switchyard breaker control cables and connections are within the scope of license renewal.

Standby transformers 1 and 2 are connected to the 345 kV switchyard north (Unit 1) and south (Unit 2) bus via disconnect S014 (Unit 1), and S024 (Unit 2). The standby transformers, the overhead transmission lines, and the switchyard disconnects are within the scope of license renewal.

A position paper was created to summarize the results of a review of the SBO documentation for STP. The position paper identifies the SSCs credited with coping and recovering from a SBO. The SSCs identified in the SBO position paper were used in scoping evaluations to identify SSCs that demonstrate compliance with 10 CFR 50.63.

License renewal drawing LR-STP-ELEC-00000E0AAAA schematically shows the portions of the plant AC electrical distribution system, including the SBO recovery path, that are included within the scope of license renewal and is summarized in Figure 2.1-2, Station Blackout Recovery Path.

SSCs classified as satisfying criterion 10 CFR 54.4(a)(3) related to station blackout are identified as within the scope of license renewal.

2.1.3 Scoping Methodology

Scoping of SSCs was performed to the criteria of 10 CFR 54.4(a) to identify those SSCs within the scope of the license renewal rule. The following sections describe the methodology used for scoping. Separate discussions of mechanical system scoping methodology, structures scoping methodology, and electrical and I&C system scoping methodology are provided.

2.1.3.1 Mechanical System Scoping Methodology

A list of mechanical systems was developed using the master equipment database and system plant numbering procedures and is documented in a technical position paper. These mechanical systems were evaluated to each of the criteria of 10 CFR 54.4(a). The list of mechanical systems and the results of the scoping process are provided in Section 2.2.

For every mechanical system listed in Table 2.2-1, STP Scoping Results, the following scoping process was applied.

- Identification of the system purpose and functions
- Comparison of system intended functions against criteria of 10 CFR 54.4(a)(1-3)
- Identification of supporting systems
- Determination of the license renewal boundary
- Creation of license renewal boundary drawings
- Component level scoping
- Documentation of scoping results and references

Identification of the System Purpose and Functions

A description was prepared for each mechanical system that included the purpose and summarized the functions that the system was designed to perform. This summary description was prepared using information obtained from the UFSAR system descriptions, CLB documents, design basis documents (including piping schematics), and system operating descriptions. The system scoping summaries included in Section 2.3 provide the system description, system intended functions, and reference to the license renewal boundary drawings for each mechanical system in the scope of the Rule.

Comparison of System Functions Against 10 CFR 54.4(a)(1-3)

System functions were compared against the criteria of 10 CFR 54.4(a)(1), (a)(2), and (a)(3). The system functions were identified from the information sources previously described. Each of the system functions satisfying the scoping criteria in 10 CFR 54.4(a) was identified as a system intended function. Functions performed by safety-related portions of the evaluated system were identified as satisfying criterion (a)(1). Functions performed by nonsafety-related systems or parts of such systems that are required to ensure success of a safety-related function were identified as satisfying criterion (a)(2). Systems and structures that were credited in one of the regulated events were identified as satisfying criterion (a)(3).

Any system that performed one or more intended functions (i.e., satisfying criterion (a)(1), (a)(2), or (a)(3)) was classified as a system within the scope of the license renewal rule. Those systems for which no functions were identified as satisfying any of the three scoping criteria were classified as systems outside the scope of the Rule. For systems classified as outside the scope of the Rule, no further evaluation was performed, and the system description documented earlier was augmented to state that the system was determined to not be within the scope of the Rule. When a system was determined to be outside the scope of the Rule, all of the components for that system were identified as outside the scope of the Rule and were excluded from further scoping or screening evaluations.

Identification of Supporting Systems

After a system was determined to be in the scope of the Rule for criteria (a)(1) or (a)(3), a review of CLB documentation was performed to identify all of its supporting systems that support the intended functions. Each of the supporting systems was then reviewed to determine if its failure could prevent satisfactory accomplishment of any intended functions of the in-scope system. When it was determined that a supporting system was needed to maintain an intended function of the in-scope system, the supporting system was determined to be in scope.

Determination of the License Renewal Boundary

After the system functions were identified, the system boundary was determined and marked–up on P&IDs. The components needed for the system to perform its intended functions were included within the license renewal boundary. The system scoping summaries included in Section 2.3 provide a description of the license renewal boundary for each mechanical system in the scope of the Rule.

The process to determine the system license renewal boundary required examination of interfaces with other systems. System interfaces were evaluated to ensure that all components were included in the boundary of one of the interfacing systems.

Creation of License Renewal Boundary Drawings

License renewal boundary drawings were created for mechanical systems determined to be within the scope of license renewal. The license renewal boundary drawings were created in conjunction with the component scoping. License renewal boundary drawings reflect the portion of the system determined to be within the scope of license renewal. The diagrams were created by highlighting the P&IDs associated with the mechanical system being evaluated. License renewal boundary drawings include: 1) the system boundary and interfaces; 2) the in-scope components whose function is required to ensure success of the system intended functions; and 3) the out-of-scope components whose function is not required to ensure success of the system-level intended functions. Nonsafety-related SSCs included within the scope of license renewal solely for 10 CFR 54.4(a)(2) are also shown on the license renewal boundary drawings.

P&IDs were highlighted to show the license renewal boundary. Component level scoping results from the master equipment database were used together with P&IDs to confirm each unit's boundaries/interfaces and components within the license renewal boundary.

Component Level Scoping

System components are uniquely identified by the combination of plant name, unit, system name, system identification, component descriptions, and component types. Unless otherwise noted, components are evaluated with their respective plant system.

A component was determined to be in scope if that component was needed to fulfill a system intended function meeting the safety-related criteria of 10 CFR 54.4(a)(1), the nonsafety-related affecting safety-related criterion of 10 CFR 54.4(a)(2), and/or if the component was needed to support the criteria of 10 CFR 54.4(a)(3) for regulated events. The results of the component scoping are documented.

The license renewal boundary drawing for each in-scope system was reviewed to identify those components within the system required to support the system intended functions. Each system P&ID was reviewed, and any commodity types, such as tubing, indicated on the drawing were reviewed and evaluated.

License renewal documentation includes uniquely-identified components that are not shown on the license renewal boundary drawings. Each of these components was evaluated individually to determine whether the component supports a safety-related system intended function, meets the criteria of 10 CFR 54.4(a)(2), or is credited for a regulated event. Components meeting one of these three criteria were identified as within the scope of the Rule. Components not meeting any of these three criteria were identified as out of scope.

The component scoping methodology described above was performed for every mechanical component found within an in-scope system. Electrical and instrument and control components within in-scope mechanical systems were included within the scope of license renewal and evaluated as described in Section 2.1.3.3. Instrument and control components with mechanical functions such as flow elements, flow indicators, flow orifices, and sight gauges were evaluated in their respective mechanical systems.

Mechanical system components that were identified as in scope for license renewal were then screened against the criteria of 10 CFR 54.21(a)(1) to determine whether they were subject to an AMR. The screening methodology is discussed in Section 2.1.4.

Document Scoping Results and References

Throughout the scoping process described above, scoping results were documented for each mechanical system. The CLB and design basis documents reviewed in support of the scoping activities were also documented.

2.1.3.2 Structure Scoping Methodology

A list of structures was developed that included buildings, tank foundations, and other miscellaneous structures. These structures are listed in Table 2.2-1, STP Scoping Results. The STP UFSAR was relied upon to identify the safety classifications of structures and structural components.

The scoping methodology utilized for structures was similar to the mechanical system-level scoping described in Section 2.1.3.1. Structure descriptions were prepared, including the structure purpose and functions. Structure evaluation boundaries were determined, including examination of structure interfaces. Structure functions were evaluated against the criteria of 10 CFR 54.4(a)(1), (a)(2) and (a)(3) and the results of this evaluation were documented. Engineers preparing mechanical and electrical license renewal documents were consulted to ensure that structures and structural components required to support in-scope SSCs were included in the structural scope.

Structural License Renewal Site Drawing

Unlike mechanical systems, individual license renewal boundary drawings were not created for structures. However, a license renewal site drawing (LR-STP-STRUC-9Y100M00001) was created for structures based on the site plan. The license renewal site drawing displays all of the structures in relation to one another.

Structural Component Scoping

Although the controlled master equipment database does include some structural components, it does not include most of the structural components that are evaluated. For structures determined to be within the scope of license renewal, structural drawings were reviewed to identify structural elements (such as steel structures, foundations, floors, walls, ceilings, penetrations, stairways or curbs). For in-scope structures, structural components that are required to support the intended functions of the structure were identified and documented. Some individual structural components fabricated from the same material and exposed to the same environment were evaluated as a generic component, such as "structural steel" to represent all of the carbon steel beams and columns in a given building. For each in-scope structure, all of the structural components were evaluated and a determination was made as to whether the structural component was required to support the intended functions of the structure. Structural components that support the intended functions of the structure were included within the scope of license renewal.

2.1.3.3 Electrical and I&C System Scoping Methodology

A list of electrical and I&C systems was developed and the systems were scoped against the criteria of 10 CFR 54.4(a). The list of electrical and instrument and control systems and the results of the scoping are provided in Table 2.2-1, STP Scoping Results.

System Level Scoping

At the system level, the scoping methodology utilized for electrical and instrument and control systems was similar to the mechanical system-level scoping described in Section 2.1.3.1. The UFSAR descriptions, database records, CLB documents and design basis documents applicable to the system were reviewed to determine the system safety classification and to identify all of the system functions. System level functions were evaluated against the criteria of 10 CFR 54.4(a)(1), (a)(2) and (a)(3). The supporting systems needed to maintain the in-scope system intended functions were identified and evaluated against the criteria in 10 CFR 54.4(a)(2). The results of the system level scoping along with a list of references supporting the evaluation of each electrical and instrument and control system were documented.

Electrical License Renewal Single Line Drawing

Unlike mechanical systems, individual license renewal boundary drawings were not created for each electrical and I&C system. A license renewal single line drawing (LR-STP-ELEC-00000E0AAAA) was created from the plant one-line diagram. The license renewal single line drawing schematically shows the portions of the AC electrical distribution system, including the station blackout recovery path, that are included within the scope of license renewal.

Component Level Scoping

Electrical and I&C components that perform an intended function as described in 10 CFR 54.4 for in-scope systems were included within the scope of license renewal.

The controlled master equipment database does not list electrical component types such as cable, connections, fuse holders, terminal blocks, high-voltage transmission conductor, connections and insulators, switchyard bus and connections. During scoping the installed electrical components were identified by reviewing documents such as plant drawings and databases. Additionally, industry documents, such as NEI 95-10, provide a list of typical electrical components found in nuclear power plants. These lists were reviewed against engineering information for the plant to determine which electrical component types are installed at STP. The electrical component types installed at STP but not listed in the master equipment database were evaluated as generic components during component screening.

2.1.4 Screening Methodology

Screening is the process of identifying and listing the structures and components that are subject to an AMR. This section, and the accompanying subsections for mechanical systems, structures, and electrical and instrument and control systems, describes the process used to perform screening for STP.

The structures and components categorized as within the scope of license renewal were screened against the criteria of 10 CFR 54.21(a)(1)(i) and (1)(ii) to determine whether they are subject to AMR.

10 CFR 54.21 states that the structures and components subject to an AMR shall encompass those structures and components within the scope of the license renewal rule if they perform an intended function, as described in 10 CFR 54.4, without moving parts or without a change in configuration or properties; and are not subject to replacement based on a qualified life or specified time period. The word “passive” is used in the screening process for all components that perform intended functions without moving parts, or a change in configuration or properties. All components that are not “passive” are known as “active”. The word “long-lived” is used in the screening process for all components that are not subject to replacement based on qualified life or specific time period.

NEI 95-10, Appendix B, *Typical Structure, Component and Commodity Groupings and Active/Passive Determinations for the Integrated Plant Assessment*, provides industry guidance for screening structures and components. The guidance provided in NEI 95-10, Appendix B, has been incorporated into the STP license renewal screening process. The screening methodology applied for each category of system and for structures is described in the following paragraphs.

The list of component intended functions utilized in the screening of mechanical, structural, and electrical component types is found in Table 2.1-1, Intended Functions Abbreviations and Definitions.

Table 2.1-1 Intended Functions: Abbreviations and Definitions

Intended Function Abbreviation	Function	Description
AN	Absorb Neutrons	Absorb neutrons
DF	Direct Flow	Provide spray shield, curbs, or mechanical components for directing flow (e.g., safety injection flow to containment sump)
EC	Electrical Continuity	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals

Table 2.1-1 Intended Functions: Abbreviations and Definitions (Continued)

Intended Function Abbreviation	Function	Description
ES	Expansion/ Separation	Provide for thermal expansion and/or seismic separation
FB	Fire Barrier	Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
FIL	Filter	Provide filtration
FLB	Flood Barrier	Provide flood protection barrier (internal and external flooding event)
GR	Gaseous Release Path	Provide path for release of filtered and unfiltered gaseous discharge
HLBS	HELB Shielding	Provide shielding against high energy line breaks
HS	Heat Sink	Provide heat sink during SBO or design basis accidents
HT	Heat Transfer	Provide heat transfer
IN	Insulate (electrical)	Insulate and support an electrical conductor
INS	Insulate	Control heat loss
LBS	Leakage Boundary (Spatial)	Nonsafety-related component that maintains mechanical and structural integrity to prevent spatial interactions that could cause failure of safety-related SSCs
MB	Missile Barrier	Provide missile barrier (internally or externally generated)
PB	Pressure Boundary	Provide pressure-retaining boundary so that sufficient flow at adequate pressure is delivered, or provide fission product barrier for containment pressure boundary, or provide containment isolation for fission product retention
PR	Pressure Relief	Provide over-pressure protection
PWR	Pipe Whip Restraint	Provide pipe whip restraint

Table 2.1-1 Intended Functions: Abbreviations and Definitions (Continued)

Intended Function Abbreviation	Function	Description
SH	Shelter, Protection	Provide shelter/protection to safety-related components
SIA	Structural Integrity (attached)	Nonsafety-related component that maintains mechanical and structural integrity to provide structural support to attached safety-related piping and components
SLD	Shielding	Provide shielding against radiation
SP	Spray	Convert fluid into spray
SPB	Structural Pressure Boundary	Provide pressure boundary or essentially leak tight barrier to protect public health and safety in the event of any postulated design basis events
SS	Structural Support	Provide structural and / or functional support to safety-related and/or nonsafety-related components
TH	Throttle	Provide flow restriction

2.1.4.1 Mechanical System Component Screening Methodology

After a mechanical system component was categorized as in scope, the classification as an active or passive component was determined based on evaluation of the component description and type. The active/passive component determinations documented in NEI 95-10, *Appendix B*, provided guidance for this activity. In-scope components that were determined to be passive and long-lived were documented as subject to AMR.

Each component that was identified as subject to an AMR was evaluated to determine its component intended function(s). The component intended function(s) was identified based on an evaluation of the component type and the way(s) in which the component supports the system intended functions. The results of the component screening were documented.

During the screening process, components that were identified as short-lived were eliminated from the AMR process and the basis for the classification as short-lived was documented. Other in-scope passive components were identified as subject to an AMR.

Consumables were considered in the process for determining the structures and components subject to an AMR. Consumables comprise the following four categories: (1) packing, gaskets, component seals, O-rings; (2) structural sealants; (3) oil, grease, and component filters; (4) system filters, fire extinguishers, fire hoses, and air packs. Consumables were considered as short-lived if replaced based on the guidelines of NEI 95-10, Table 4.1-2*, Treatment of Consumables* and NUREG-1800, Table 2.1-3, *Specific Staff Guidance on Screening*.

Thermal insulation was treated as a passive, long-lived component during the scoping and screening process. For systems where it has an intended function, insulation was considered within the scope of license renewal and subject to AMR, and is included as a component type in each appropriate in-scope system

2.1.4.2 Structural Component Screening Methodology

Structures and structural components typically perform their functions without moving parts and without a change in configuration or properties. When a structure or structural component was determined to be in scope of license renewal by the scoping process described in Section 2.1.3.2, the structure screening methodology classified the component as active or passive. Active components do not require aging management. This is consistent with guidance found in NEI 95-10, *Appendix B*. During the structural screening process, the intended function(s) of passive structural components were documented. In the structure screening process, an evaluation was made to determine whether in-scope structural components were subject to replacement based on a qualified time period. If an in-scope structural component was determined to be subject to replacement based on a qualified time period, the component was identified as short-lived and was excluded from an AMR. In such a case, the basis for determining that the structural component was short-lived was documented. The list of component intended functions utilized in the screening of structural components is found in Table 2.1-1, Intended Functions Abbreviations and Definitions.

2.1.4.3 Electrical and I&C Component Screening Methodology

The in-scope electrical components were categorized as “active” or “passive” based on the determinations documented in NEI 95-10, *Appendix B*. The screening of electrical and I&C components used the spaces approach which is consistent with the guidance in NEI 95-10. The spaces approach to AMR is based on areas where bounding environmental conditions are identified. The bounding environmental conditions are applied during AMR to evaluate the aging effects on passive electrical component types that are located within the bounding area. Use of the spaces approach for AMR of electrical component types eliminates the need to associate electrical and I&C components with specific systems that are within the scope of license renewal. The passive long-lived electrical and I&C components that perform an intended function without moving parts or without change in configuration or properties were grouped into component types such as cable, connections, fuse holders, terminal blocks, high-voltage transmission conductor, connections and insulators, metal enclosed bus, switchyard bus and connections. Component-level intended function(s) were determined for each in-scope passive electrical component group and documented. The passive in-scope electrical component types were documented as subject to an AMR. A list of the passive in-scope electrical component types subject to aging management is provided in Table 2.5-1, Electrical and I&C Component Groups Requiring Aging Management Review.

2.1.5 Interim Staff Guidance

As lessons are learned during license renewal application reviews, the NRC staff has developed guidance documents to capture new insights or address emerging issues. To document these lessons learned, the staff has developed an interim staff guidance (ISG) process that provides guidance to future license renewal applicants until the emerging issues can be incorporated into the next revision of the license renewal guidance documents. Many of the previous issues have been closed and incorporated into license renewal guidance documents. Table 2.1-2, NRC Interim Staff Guidance Associated with License Renewal provides the status of open ISGs.

Table 2.1-2 NRC Interim Staff Guidance Associated with License Renewal

Issue Number	Purpose	Discussion Status
LR-ISG-19B	Cracking of nickel-alloy components in the reactor coolant pressure boundary	The NRC staff has prepared a draft aging management program, XI.M11B, "Cracking of Nickel-Alloy Components in the Reactor Coolant Pressure Boundary." This program will be included in the update of NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, and will not become an LR-ISG.
LR-ISG-23	Replacement parts necessary to meet 10 CFR 50.48 (Fire Protection) To provide guidance on how to handle replacement parts for 10 CFR 50.48	The staff has determined LR-ISG-23 is not needed.
LR-ISG-2006-01	Corrosion of the Mark I Steel Containment Drywell Shell	The staff has issued final LR-ISG-2006-01
LR-ISG-2006-02	Staff Guidance on Acceptance Review for Environmental Requirements	The staff has withdrawn proposed LR-ISG-2006-02.
LR-ISG-2006-03	Staff Guidance for Preparing Severe Accident Mitigation Alternatives (SAMA) Analyses	The staff has issued LR-ISG-2006-03.

Table 2.1-2 NRC Interim Staff Guidance Associated with License Renewal (Continued)

Issue Number	Purpose	Discussion Status
LR-ISG-2007-01	Updating the LR-ISG Process to Include References to the Environmental Review Guidance Documents, References for the Recent Publication of Revision 1 of the License Renewal Guidance Documents, and Minor Revisions to Be Consistent with Current Staff Practices	The staff has issued LR-ISG-2007-01.
LR-ISG-2007-02	Changes to Generic Aging Lesson Learned (GALL) Report Aging Management Program (AMP) XI.E6, “Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”	The staff has issued LR-ISG–2007-02
LR-ISG-2008-01	Staff Guidance Regarding Station Blackout Rule (10 CFR 50.63) Associated with License Renewal Applications	This ISG has been withdrawn
LR-ISG-2009-01	Staff Guidance Regarding Plant-Specific Aging Management Review and Aging Management Program for Neutron-Absorbing Material in Spent Fuel Pools	The staff has issued LR-ISG–2009-01.

The following sections provide a summary discussion of each of the issued NRC Interim Staff Guidance positions.

2.1.5.1 (LR-ISG-2006-01) Corrosion of the Mark I Steel Containment Drywell Shell

This LR-ISG is only applicable to certain BWRs and not applicable to STP.

2.1.5.2 (LR-ISG-2006-03) Staff Guidance for Preparing Severe Accident Mitigation Alternatives (SAMA) Analyses

This LR-ISG was issued as final and is applicable to STP. The STP severe accident mitigation alternatives analysis, provided as a part of Appendix E of this application, is consistent with the guidance of NEI 05-01, *Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document,* Revision A as discussed in this LR-ISG.

2.1.5.3 (LR-ISG-2007-01) Updating the LR-ISG Process to Include References to the Environmental Review Guidance Documents, References for the Recent Publication of Revision 1 of the License Renewal Guidance Documents, and Minor Revisions to Be Consistent with Current Staff Practices

The staff has issued this LR-ISG to provide guidance on the License Renewal Interim Staff Guidance process.

2.1.5.4 (LR-ISG-2007-02) Changes to Generic Aging Lesson Learned (GALL) Report Aging Management Program (AMP) XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements"

The staff has issued this LR-ISG and it is applicable to STP. The STP Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is addressed in Section B2.1.36.

2.1.5.5 (LR-ISG-2009-01) Aging Management of Spent Fuel Pool Neutron - Absorbing Materials Other Than Boraflex.

The staff has issued this ISG and it is not applicable to STP. STP does not credit the use of neutron-absorbing materials in the spent fuel pool. STP credits physical design, center-to-center spacing, soluble boron, and administrative procedures to control criticality in the spent fuel pool.

2.1.6 Generic Safety Issues

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, review of NRC Generic Safety Issues (GSIs) as part of the license renewal process is required to satisfy a finding per 10 CFR 54.29. GSIs that involve issues related to license renewal aging management reviews or time-limited aging analyses are to be addressed in the LRA. As a result of the review of NUREG-0933, Supplement 32, dated July 2008, the following GSIs have been evaluated for license renewal:

1. GSI-163, Multiple Steam Generator Tube Leakage

This GSI involves the potential multiple steam generator tube leaks during a main steam line break that cannot be isolated. Steam generator tubes are part of the reactor coolant pressure boundary and are the subject of an AMR and TLAA evaluation as documented in Section 3.1 and Chapter 4 respectively. Aging management of steam generator tubes is addressed within the CLB of the plant and will continue to be addressed during the period of extended operation by the Steam Generator Tube Integrity program discussed in Section B2.1.8.

2. GSI-190, Fatigue Evaluation of Metal Components for 60-year Plant Life

This GSI addresses fatigue life of metal components and was closed by the NRC. However, the NRC concluded that license renewal applicants should address the effects of reactor coolant environment on component fatigue life. Accordingly, the issue of environmental effects on component fatigue life is addressed in Section 4.3.

3. GSI-191, Assessment of Debris Accumulation on PWR Sump Performance

GSI-191 addresses the potential for blockage of containment sump strainer assembly that filters debris from cooling water supplied to the safety injection and containment spray pumps following a postulated LOCA. The issue is based on containment strainer design and on the identification of new potential sources of debris that may block the sump strainers. STPNOC submitted to the NRC a response to Generic Letter (GL) 2004-02 by STPNOC NOC-AE- 05001862, *90-Day Response to Generic Letter 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors*, dated March 8, 2005, *South Texas Project, Units 1 and 2 - Supplement 1 to the Response to Generic Letter 2004-02 (TAC Nos. MC4719 and MC4720)*, and later supplements. The issues identified in GSI-191 and GL 2004-2 are not aging-related issues. Also, the issues are not related to the 40-year term of the current operating license, and therefore, are not time-limited aging analyses. The containment sump strainer assemblies are evaluated in Section 2.3.2.4, Safety Injection, and the containment sumps are evaluated in Section 2.4.1, Containment Building.

2.1.7 Conclusions

The scoping and screening methodology described above was used for the STP integrated plant assessment to identify SSCs that are within the scope of license renewal and require an aging management review. The methods are consistent with the current NEI and NRC guidance and thereby fully meet the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

Figure 2.1-1 Scoping and Screening Process Flow

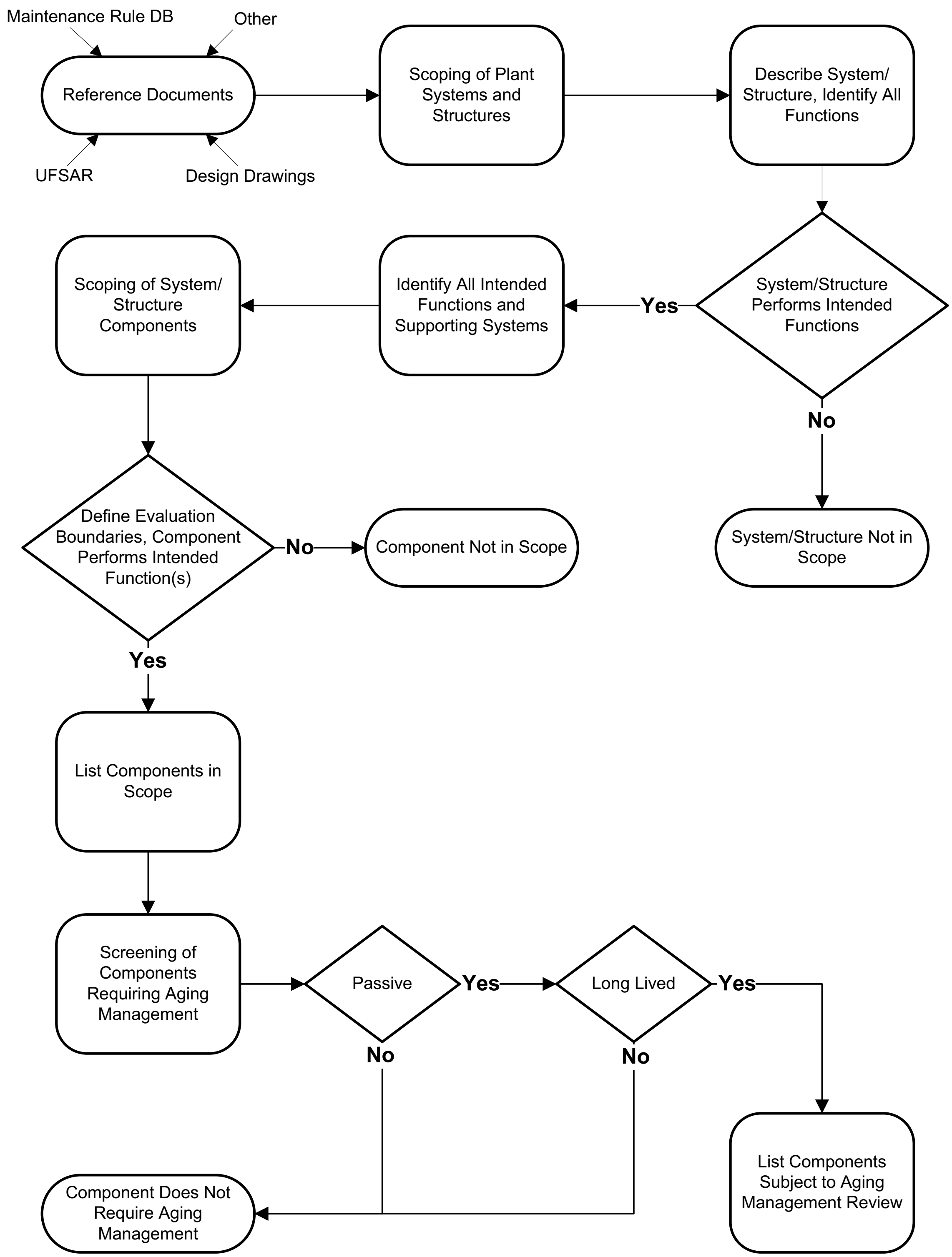
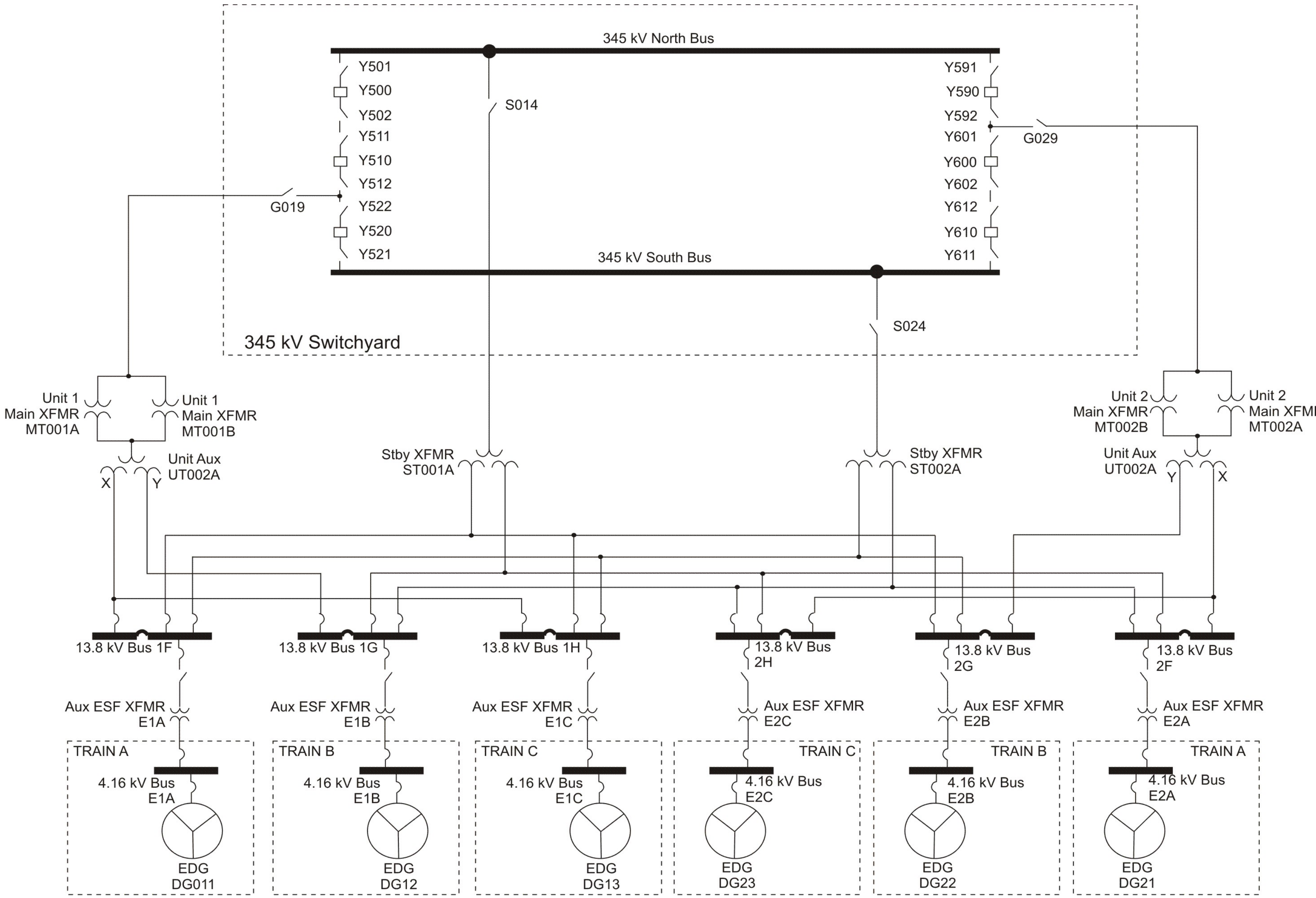


Figure 2.1-2 Station Blackout Recovery Path



2.2 PLANT-LEVEL SCOPING RESULTS

Table 2.2-1, STP Scoping Results provides the results of the STP assessment to identify the plant systems and structures that are within the scope of license renewal. Table 2.2-1, STP Scoping Results lists all STP mechanical, electrical and instrument and control systems and structures. For in-scope mechanical systems and structures, a reference is given to the appropriate section that provides a description of the system or structure and the screening results (component function relationship tables) of the system or structure.

For electrical and I&C systems, no description is provided since these systems were evaluated based on the "spaces approach" as introduced in Section 2.1.4.3 and more fully described in Section 2.5.

For each mechanical system within the scope of license renewal, components subject to aging management review are highlighted on license renewal boundary drawings, as noted in Section 2.1.3, indicating the evaluation boundaries of the systems.

For structures within the scope of license renewal, the structural components subject to aging management review are listed in the component function relationship tables. A license renewal site drawing, as noted in Section 2.1.3.2, indicates the structures within the scope of license renewal.

Table 2.2-1 STP Scoping Results

System/Structure	In-Scope	Section 2 Scoping Results
Reactor Vessel, Internals, and Reactor Coolant System		
Pressurizer	Yes	2.3.1.3
Reactor Coolant	Yes	2.3.1.2
Reactor Core	Yes	2.3.1.5
Reactor Vessel and Internals	Yes	2.3.1.1
Steam Generator also includes: Steam Generator Secondary Side	Yes	2.3.1.4
Engineered Safety Features		
Containment Spray	Yes	2.3.2.1
Integrated Leak Rate Test	Yes	2.3.2.2
Residual Heat Removal	Yes	2.3.2.3
Safety Injection	Yes	2.3.2.4
Auxiliary Systems		
Chemical and Volume Control	Yes	2.3.3.19
Chilled Water HVAC	Yes	2.3.3.9
Component Cooling Water	Yes	2.3.3.6
Compressed Air Systems also includes: Breathing Air Instrument Air Service Air	Yes	2.3.3.7
Containment Hydrogen Monitoring and Combustible Gas Control	Yes	2.3.3.16

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Cranes and Hoists	Yes	2.3.3.3
Nonsafety-related Diesel Generators and Auxiliary Fuel Oil, includes: BOP Diesel Auxiliary Fuel Oil	Yes	2.3.3.21
Diesel Generator Building HVAC	Yes	2.3.3.15
Electrical Auxiliary Building and Control Room HVAC	Yes	2.3.3.10
Essential Cooling Water and Essential Cooling Water Screen Wash	Yes	2.3.3.4
Fire Protection	Yes	2.3.3.17
Fuel Handling	Yes	2.3.3.1
Fuel Handling Building HVAC	Yes	2.3.3.11
Liquid Waste Processing	Yes	2.3.3.22
Mechanical Auxiliary Building HVAC	Yes	2.3.3.12
Miscellaneous HVAC, includes: Essential Cooling Water Intake Structure Fire Pump House	Yes	2.3.3.13
Miscellaneous systems in-scope ONLY for Criterion a(2) Includes: Boron Recycling Condensate Storage Condensate includes: - BOP Chemical Feed - Condensate Polisher - Condenser Air Removal Essential Cooling Pond Makeup Gaseous Waste Processing Low Pressure Nitrogen MAB Plant Vent Header (Radioactive) Nonradioactive Chemical Waste Open Loop Auxiliary Cooling Potable Water and Well Water Secondary Process Sampling Solid Waste Processing Turbine Vents and Drains	Yes	2.3.3.27

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Nonradioactive Waste Plumbing Drains and Sumps	Yes	2.3.3.24
Oily Waste	Yes	2.3.3.25
Primary Process Sampling also includes: Post Accident Sampling	Yes	2.3.3.8
Radiation Monitoring (area and process) Mechanical	Yes	2.3.3.26
Radioactive Vents and Drains	Yes	2.3.3.23
Reactor Containment Building HVAC	Yes	2.3.3.14
Reactor Makeup Water	Yes	2.3.3.5
Spent Fuel Pool Cooling and Cleanup	Yes	2.3.3.2
Standby Diesel Generator and Auxiliaries also includes: Standby Diesel Generator Air Intake Standby Diesel Generator Exhaust Standby Diesel Jacket Water Standby Diesel Generator Lube Oil Standby Diesel Generator Starting Air	Yes	2.3.3.20
Standby Diesel Generator Fuel Oil Storage and Transfer	Yes	2.3.3.18
Chemical Injection Monitoring and Control	No	N/A
Closed Loop Auxiliary Cooling Water	No	N/A
Fresh Water and Service Water Supply also includes: Sodium Hypochlorite Fresh Water Service Water	No	N/A
Circulating Water also includes: Seal Water and Priming (Circulating Water) Circulating Water Screen Wash	No	N/A
Turbine Generator Building HVAC	No	N/A
Gas Storage and Supply includes: Gas CO_2 Storage Gas H_2 Storage Gas N_2 High Pressure Supply	No	N/A
Miscellaneous HVAC (Not In Scope)	No	N/A
Nonradioactive Waste also includes: Sewage Treatment	No	N/A

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Reservoir Makeup and Blowdown also includes: Reservoir Makeup Pumping RMPF Seal Water RMPF Screen Wash Cooling Water Reservoir Spillway Gates and Blowdown Facilities	No	N/A
Water Processing also includes: Acid Storage and Transfer Caustic Storage and Transfer	No	N/A
Steam and Power Conversion System		
Auxiliary Feedwater	Yes	2.3.4.6
Auxiliary Steam System and Boilers	Yes	2.3.4.2
Demineralizer Water (Make-up)	Yes	2.3.4.4
Electrohydraulic Control	Yes	2.3.4.7
Feedwater	Yes	2.3.4.3
Main Steam also includes: Main Steam Vents and Drains Header Drain Downstream -	Yes	2.3.4.1
Steam Generator Blowdown also includes: Steam Generator Sludge Lancing and Chemical Cleaning	Yes	2.3.4.5
Feed Pump Turbine Lube Oil	No	N/A
Lube Oil Purification Storage and Transfer also includes: Lube Oil Conditioner	No	N/A
Main Turbine	No	N/A
Turbine/Generator Auxiliaries also includes: Extraction Steam Stator Cooling Water Generator CO_2 and H_2 Turbine Gland Seal Heater Drip Heater Vent Main Turbine Lube Oil Turbine Vents and Drains Generator Hydrogen Seal Oil	No	N/A

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Containments, Structures, and Component Supports		
Auxiliary Feedwater Storage Tank Foundation and Shell	Yes	2.4.10
Containment Building	Yes	2.4.1
Control Room	Yes	2.4.2
Diesel Generator Building	Yes	2.4.3
Electrical Foundations and Structures	Yes	2.4.7
Essential Cooling Water Structures also includes: Essential Cooling Water Intake Structure Essential Cooling Pond and ECW Discharge	Yes	2.4.9
Fuel Handling Building	Yes	2.4.8
Mechanical-Electrical Auxiliary Building (MEAB) also includes: Electrical Auxiliary Building Mechanical Auxiliary Building Isolation Valve Cubicle (Building)	Yes	2.4.5
Miscellaneous Yard Areas and Buildings (In-Scope) also includes: Fire pump house Fire water storage tanks foundations Fire water valve structures	Yes	2.4.6
Supports	Yes	2.4.11
Turbine Generator Building	Yes	2.4.4

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Miscellaneous Structures includes: Administration Building Ambulance Building Aux Fuel Oil Transfer Pump Station, tank foundation, and dike Bulk Gas Storage Facility Chemical and Gas Storage Circulating Water Intake Structure Circulating Water Discharge Structure Cold Chemistry Lab East Gate House Electrical Load Center Buildings Emergency Operations Facility Foam Equipment House Fuel Storage Facility Guard Facility, Gates, and Fences Hot Shop and Decontamination Facility Hypochlorination Building Inverter Building Lighting Diesel Generator Building Machine Shop Main Cooling Reservoir Maintenance Coatings Storage Structure Maintenance Lubrication Storage Structure Maintenance Operations Facility Makeup Demineralizer Building Microwave Building NPMM Product Staging Structure North Gate House Nuclear Training Facility (Training and Simulator Building) Old Reactor Vessel Head Storage Building Old Steam Generator Storage Facility On-Site Staging Facility Refueling Equipment Building (Cement Unloading Building) Sewage Treatment Building Spillway and Blowdown Facilities Storm Water Drainage System (Including the roof drains) TSC Diesel Generator Building Temporary Gate House Unit 1 Stop Shop Unit 2 Change Facility Unit 2 Stop Shop Warehouse Annex Warehouse No. 29 (Includes Outage Facility West Gate House	No	N/A

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Electrical and Instrumentation and Controls		
120 VAC Class 1E Vital	Yes	N/A
120 VAC Non-1E Vital	Yes	N/A
125 VDC Class 1E	Yes	N/A
125 VDC Non-Class 1E	Yes	N/A
480 VAC Non-1E Load Centers	Yes	N/A
480 VAC Class 1E Load Centers	Yes	N/A
480 VAC Class 1E MCC and Distribution Panels	Yes	N/A
480 VAC Non-1E MCC and Distribution Panels	Yes	N/A
4K VAC 1E Power	Yes	N/A
13.8K VAC Aux Power	Yes	N/A
7300 Processor Support	Yes	N/A
Communication	Yes	N/A
Emergency AC Lighting	Yes	N/A
Emergency DC Lighting	Yes	N/A
Engineered Safety Features Actuation	Yes	N/A
Fire Alarm and Detection	Yes	N/A
Incore Instrumentation	Yes	N/A
Main and Auxiliary Transformers	Yes	N/A
Nuclear Instrumentation	Yes	N/A
Panels and Cabinets	Yes	N/A
Post Accident Monitoring	Yes	N/A
Radiation Monitoring (Area and Process)	Yes	N/A

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Rod Control	Yes	N/A
Solid State Protection	Yes	N/A
Standby Transformer (Startup)	Yes	N/A
Switchyard	Yes	N/A
208/120 VAC Non Class 1E Non-Vital System -	No	N/A
250 VDC Non-Class 1E	No	N/A
48 VDC Non-Class 1E	No	N/A
4K VAC Non-class 1E Power	No	N/A
13.8K V Emergency Power	No	N/A
Annunciator	No	N/A
Cathodic Protection	No	N/A
Diesel Generator (Lighting)	No	N/A
Electrical Miscellaneous.	No	N/A
Emergency Transformer	No	N/A
Environmental (Meteorological Tower)	No	N/A
ESF Status Monitoring	No	N/A
Freeze Protection	No	N/A
Generator Isophase Bus and Aux	No	N/A
Grounding and Lightning Protection	No	N/A
Integrated Computer	No	N/A
Loose Parts Monitoring	No	N/A
Main Generator (w/o Aux)	No	N/A
Main Generator Exciter	No	N/A

Table 2.2-1 STP Scoping Results (Continued)

System/Structure	In-Scope	Section 2 Scoping Results
Normal AC Lighting	No	N/A
Plant Computer	No	N/A
River Services, Transformer and Switchgear	No	N/A
Rod Position Indicator	No	N/A
Seismic Monitoring	No	N/A
Vibration Monitoring	No	N/A

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

The scoping and screening results for mechanical systems consist of lists of components and component groups that require aging management review, grouped and presented on a system basis. Brief descriptions of mechanical systems within the scope of license renewal are provided as background information. Mechanical system intended functions are provided for in-scope systems. For each in-scope system, components or component groups requiring an aging management review are provided.

Specifically, this section provides the results of the scoping and screening process for mechanical systems including:

- A general description of the system and its purpose,
- System intended function(s),
- A reference to the applicable STP UFSAR section(s),
- A reference to the applicable license renewal boundary drawing(s), and
- A listing of mechanical component types that are subject to an aging management review with the associated component intended functions.

The mechanical scoping and screening results are provided in four subsections:

- Reactor vessel, internals, and reactor coolant system (Section 2.3.1)
- Engineered safety features (Section 2.3.2)
- Auxiliary systems (Section 2.3.3)
- Steam and power conversion systems (Section 2.3.4)

2.3.1 Reactor Vessel, Internals, and Reactor Coolant System

This section addresses scoping and screening results for the following systems:

- Reactor vessel and internals (Section 2.3.1.1)
- Reactor coolant (Section 2.3.1.2)
- Pressurizer (Section 2.3.1.3)
- Steam generators (Section 2.3.1.4)
- Reactor core (Section 2.3.1.5)

2.3.1.1 Reactor Vessel and Internals

System Description

The purpose of the reactor vessel is to act as a reactor coolant system (RCS) pressure boundary, acting as a barrier against the release of radioactivity generated within the reactor. The reactor vessel internals support the reactor core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and control rod drive mechanisms (CRDMs), direct coolant flow past the fuel elements, direct coolant flow to the reactor vessel head, provide gamma and neutron shielding and guide the incore instrumentation.

The reactor vessel is cylindrical with a welded hemispherical bottom head and a removable, flanged, and gasketed hemispherical upper head. The vessel is nozzle supported. The vessel contains the core, core-supporting structures, control rods, and other parts directly associated with the core. The reactor vessel closure head contains head adaptors for the CRDMs and the head vent pipe. The O-ring leak monitoring tube penetrations are in the vessel flange. The vessel has inlet and outlet nozzles located in a horizontal plane just below the reactor vessel flange but above the top of the core. The bottom head of the vessel contains penetration nozzles for connection and entry of the nuclear in-core instrumentation.

The reactor vessel internals consist of the following major component groups: the lower core support assembly, the upper core support assembly, the in-core instrumentation support structure, and the alignment/interface components.

The lower core support assembly consists of the core barrel, the baffle-former assembly, the neutron shield panel, the core support, and the energy absorber assembly.

The upper core support assembly consists of the upper support plate and the upper core plate including the protective skirt, between which is contained the upper support columns and the control rod guide tube assemblies.

The in-core instrumentation (ICI) support structures consist of the instrument port columns (exit thermocouples), upper/lower tie plates, and the instrument columns (bottom mounted instruments).

Alignment/interface components include upper core, plate guide pins internals hold-down spring and radial support keys including clevis inserts.

System Intended Functions

The reactor vessel and internals support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and CRDMs, direct coolant flow past the fuel elements, direct coolant flow to the pressure vessel head, and provide gamma and neutron shielding and guides for incore instrumentation. The reactor vessel provides an RCS pressure boundary, acting as a barrier against the release of radioactivity generated within the reactor. Therefore, the reactor vessel and internals are within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(1).

Portions of the reactor vessel and internals are within the scope of license renewal to support fire protection, pressurized thermal shock, and station blackout requirements based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the reactor vessel and internals are included in UFSAR Sections 3.9.2, 3.9.5, 5.1, and 5.3.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for reactor vessel and internals system.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.1-1 - Reactor Vessel and Internals.

Table 2.3.1-1 Reactor Vessel and Internals

Component Type	Intended Function
CRDM Support	Structural Support
Refueling Missile Shield	Missile Barrier
RV BMI Flux Thimble	Pressure Boundary
RV BMI Guide Tube	Pressure Boundary

Table 2.3.1-1 Reactor Vessel and Internals (Continued)

Component Type	Intended Function
RV BMI Nozzle and Welds	Pressure Boundary
RV Closure Head	Pressure Boundary
RV Closure Head Bolts	Pressure Boundary
RV Core Support Lugs	Structural Support
RV CRDM Head Penetrations (Flange and Plug)	Pressure Boundary
RV CRDM Head Penetrations (Nozzle and Welds)	Pressure Boundary
RV CRDM Head Penetrations (Thermal Sleeve)	Pressure Boundary
RV CRDM Housing	Pressure Boundary
RV Exit Thermocouple Penetration Housing	Pressure Boundary
RV Exit Thermocouple Penetrations	Pressure Boundary
RV Flange Leak Monitoring Tube	Pressure Boundary
RV Head Vent Nozzle, Pipe and Welds	Pressure Boundary
RV Inlet and Outlet Nozzles	Pressure Boundary
RV Internal Disconnect Device Housing	Pressure Boundary
RV Internal Disconnect Device Penetration	Pressure Boundary
RV Nozzle Safe End Welds	Pressure Boundary
RV Nozzle Safe Ends	Pressure Boundary
RV Nozzle Support Pads	Structural Support
RV RVWLIS Penetration	Pressure Boundary
RV RVWLIS Upper Probe Housing	Pressure Boundary
RV Shell Bottom Head	Pressure Boundary
RV Upper, Intermediate, Lower Shell and Welds	Pressure Boundary

Table 2.3.1-1 Reactor Vessel and Internals (Continued)

Component Type	Intended Function
RVI Baffle Edge Bolting	Structural Support
RVI Baffle-Former Assembly	Direct Flow Shielding Structural Support
RVI Baffle-Former Assembly Bolting	Structural Support
RVI Control Rod Guide Tube Assembly	Structural Support
RVI Control Rod Guide Tube Bolting	Structural Support
RVI Control Rod Guide Tube Guide Plates	Structural Support
RVI Core Barrel Assembly	Direct Flow Shielding Structural Support
RVI Core Barrel Assembly-Former Bolting	Structural Support
RVI Hold Down Spring	Structural Support
RVI ICI Support Structures (Exit Thermocouple)	Structural Support
RVI ICI Support Structures-Instr Column (BMI)	Structural Support
RVI ICI Support Structures-Upper/Lower Tie Plates	Structural Support
RVI Irradiation Specimen Basket	Structural Support
RVI Lower Core Support Bolts	Structural Support
RVI Lower Core Support-Clevis Insert Bolting	Structural Support
RVI Lower Core Support-Core Support Plate Forging	Direct Flow Structural Support
RVI Lower Core Support-Energy Absorber Assembly	Structural Support
RVI Neutron Shield Panel	Shielding
RVI Radial Support Keys and Clevis Inserts	Structural Support
RVI Upper Core Plate Guide Pins	Structural Support
RVI Upper Core Support-Protective Skirt	Structural Support

Table 2.3.1-1 Reactor Vessel and Internals (Continued)

Component Type	Intended Function
RVI Upper Core Support-Upper Core Plate	Structural Support
RVI Upper Core Support-Upper Support Column	Structural Support
RVI Upper Core Support-Upper Support Column Base	Structural Support
RVI Upper Core Support-Upper Support Plate	Structural Support
RVI Upper Support Column Bolting	Structural Support
Seal Table	Pressure Boundary

The AMR results for these component types are provided in Table 3.1.2-1, Reactor Vessel, Internals and Reactor Coolant System – Summary of Aging Management Evaluation - Reactor Vessel and Internals.

2.3.1.2 Reactor Coolant System

System Description

The purpose of the reactor coolant system (RCS) is to transfer heat generated in the core to the steam generators during normal operation. Treated borated water circulates in the RCS, acting as a neutron moderator and reflector and as a solvent for the neutron absorber used in chemical shim control. The RCS pressure boundary provides a barrier for containing the coolant under all anticipated temperature and pressure conditions and for limiting the release of radioactivity. RCS pressure is controlled by the pressurizer in which water and steam are maintained in equilibrium by electrical heaters and water sprays.

The RCS also includes the vacuum degassing system and the reactor coolant pump oil changing system.

The purpose of the RCS vacuum degassing system is to remove gaseous products from the reactor coolant prior to reactor head removal for refueling operations. The RCS vacuum degassing system utilizes a vacuum pump in tandem with a compressor to evacuate and compress fission gases removed from the RCS and store the fission gas in two 6000 ft^3 gas storage tanks at 120 psig.

The purpose of the reactor coolant pump oil changing system is to provide the means to drain and fill the reactor coolant pump (RCP) motor oil reservoirs during cold shutdown. The reactor coolant pump oil spill collection subsystem of the pump oil changing system collects oil from all potential leakage sites in the RCP motor lube oil subsystem during normal plant operation. Drain lines large enough to accommodate the largest potential oil leak are provided from the drip pan to a collection tank sized to hold the lube oil inventory of at least one RCP motor.

The reactor coolant system consists of four similar heat transfer loops connected in parallel to the reactor pressure vessel, all of which are located inside the containment. Each loop contains a reactor coolant pump, steam generator and associated piping and valves. The system also includes a pressurizer, a pressurizer relief tank, interconnecting piping and instrumentation. The reactor pressure vessel and internals, steam generators and pressurizer are evaluated separately as other systems.

The vacuum degassing and pump oil changing systems perform no safety function except for the containment isolation valves and their attached piping. The reactor coolant pump oil spill collection subsystem functions to reduce possible fire hazards due to oil leakage during normal plant operation.

System Intended Functions

The RCS pressure boundary provides a barrier to limit the release of radioactivity. The system is designed to maintain the reactor coolant pressure boundary integrity at the temperatures and pressures experienced under normal modes of operation and anticipated transients. The reactor coolant, vacuum degassing, and pump oil changing systems provide containment isolation for penetrations where components interface with systems outside of containment. Therefore, the reactor coolant system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the reactor coolant system are within the scope as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the reactor coolant system are within the scope of license renewal to support fire protection, environmental qualification, and station blackout requirements based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the reactor coolant system are included in UFSAR Sections 5.1, 5.2, 5.4, 8.3.4, 9.5.1, and 11.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the reactor coolant system are listed below:
LR-STP-RC-5R149F05001#1
LR-STP-RC-5R149F05003#1
LR-STP-RC-5R149F05004#1
LR-STP-RC-5R349F05046#1

LR-STP-RC-5R379F05042#1
LR-STP-RC-5R149F05001#2
LR-STP-RC-5R149F05003#2
LR-STP-RC-5R149F05004#2
LR-STP-RC-5R349F05046#2
LR-STP-RC-5R379F05042#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.1-2 - Reactor Coolant System

Table 2.3.1-2 Reactor Coolant System

Component Type	Intended Function
Class 1 Piping <= 4in	Pressure Boundary
Closure Bolting	Pressure Boundary
Flow Element	Leakage Boundary (spatial)
Indicator	Leakage Boundary (spatial) Structural Integrity (attached)
Insulation	Insulate (Mechanical)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Rupture Disc	Leakage Boundary (spatial)
Tank	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.1.2-2, Reactor Vessel, Internals and Reactor Coolant System – Summary of Aging Management Evaluation - Reactor Coolant System.

2.3.1.3 Pressurizer

System Description

The purpose of the pressurizer is to provide a point in the RCS where liquid and vapor are maintained at equilibrium temperature and pressure under saturated conditions for pressure control purposes.

During an outsurge from the pressurizer, flashing of water to steam and generation of steam by automatic actuation of the heaters keep the pressure above the minimum allowable limit. During an insurge from the RCS, the spray system, which is fed from two cold legs, condenses steam in the vessel to prevent the pressurizer pressure from reaching the setpoint of the power-operated relief valves for normal design transients. Heaters are energized on high water level during insurge to heat the subcooled surge water that enters the pressurizer from the reactor coolant loop.

The pressurizer consists of a vertical, cylindrical vessel with essentially hemispherical top and bottom heads constructed of carbon steel, with austenitic stainless steel cladding on all surfaces exposed to the reactor coolant. The surge line nozzle and removable electric heaters are installed in the bottom head. A thermal sleeve is provided to minimize stresses in the surge line nozzle. Spray line nozzles and relief and safety valve connections are located in the top head of the vessel. Spray flow is modulated by automatically controlled air-operated valves.

The valves and piping associated with the pressurizer are evaluated with the RCS in Section 2.3.1.2.

System Intended Functions

The pressurizer is part of the RCS pressure boundary. It is designed to accommodate positive and negative reactor coolant surges caused by RCS transients. Therefore, the pressurizer is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The pressurizer is within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the pressurizer are included in UFSAR Sections 5.1, 5.2, and 5.4.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the pressurizer.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.1-3 - Pressurizer.

Table 2.3.1-3 Pressurizer

Component Type	Intended Function
Closure Bolting	Pressure Boundary
PZR Heater Support Plate	Structural Support
PZR Heater Well Nozzle	Pressure Boundary
PZR Instrument Penetrations	Pressure Boundary
PZR Manways and Covers	Pressure Boundary
PZR Nozzle Thermal Sleeve	Shelter, Protection
PZR Nozzles	Pressure Boundary
PZR Safe Ends	Pressure Boundary
PZR Seismic Lug	Structural Support
PZR Shell and Head	Pressure Boundary
PZR Spray Head	Spray
PZR Support Skirt	Structural Support

The AMR results for these component types are provided in Table 3.1.2-3, Reactor Vessel, Internals and Reactor Coolant System – Summary of Aging Management Evaluation - Pressurizer.

2.3.1.4 Steam Generators

System Description

The purpose of the steam generator system is to provide heat removal from the reactor coolant system through the generation of steam and also to act as an assured source of steam to the steam driven auxiliary feedwater pump.

The steam generator system consists of the primary and secondary pressure boundaries of the steam generators including all pieces and parts within the pressure boundary and all penetrations out to the safe ends of the penetration nozzles.

System Intended Functions

The steam generator provides heat removal by the generation of steam for normal operation, design basis event mitigation, station blackout and fire safe shutdown requirements. The steam generator also provides an assured source of steam to the turbine driven auxiliary feedwater pump. The primary channel head and tubes form part of the reactor coolant pressure boundary. The steam generators form a part of the containment pressure boundary to prevent the release of fission products to the environment. Therefore, the steam generator is within the scope of license renewal based on the criteria of 10 CFR 54.4 (a)(1).

Portions of the steam generator system are within the scope of license renewal as nonsafety-related affecting safety-related component based on the criterion of 10 CFR 54.4(a)(2).

Portions of the steam generator system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the steam generators are included in UFSAR Sections 5.1, 5.2, 5.4.2, and 10.4.9.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the steam generators.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.1-4 - Steam Generators.

Table 2.3.1-4 Steam Generators

Component Type	Intended Function
SG Closure Bolting	Pressure Boundary
SG Feedwater Ring and AFW Spray Pipe	Direct Flow
SG Flow Distribution Baffle	Direct Flow Pressure Boundary Structural Support
SG Internal Structures	Direct Flow Structural Support
SG Moisture Separators	Direct Flow Structural Support

Table 2.3.1-4 Steam Generators (Continued)

Component Type	Intended Function
SG Primary Head and Divider Plate	Pressure Boundary
SG Primary Manway Covers	Pressure Boundary Structural Support
SG Primary Nozzles and Safe Ends	Pressure Boundary
SG Secondary Nozzles and Safe Ends	Direct Flow Pressure Boundary Shelter, Protection Throttle
SG Secondary Shell	Pressure Boundary
SG Secondary Side Access Covers	Pressure Boundary
SG Tube Plugs	Pressure Boundary
SG Tube Support Plates	Structural Support
SG Tubes	Heat Transfer Pressure Boundary

The AMR results for these component types are provided in Table 3.1.2-4, Reactor Vessel, Internals and Reactor Coolant System – Summary of Aging Management Evaluation - Steam Generators.

2.3.1.5 Reactor Core

System Description

The purpose of the reactor core system is to contain and support the fuel assemblies and control rods. The fuel assemblies assist in directing reactor coolant through the core to achieve acceptable flow distribution and to restrict bypass flow so that the heat transfer performance requirements can be met for all modes of operation. The fuel cladding provides a radioactive fission products barrier. Reactivity control is achieved with the use of control rods and burnable absorber rods. The fuel assemblies are designed to accept control rod insertions to provide reactivity control.

The reactor core consists of 193 fuel assemblies arranged in a pattern that approximates a right circular cylinder. Each fuel assembly contains a 17 x 17 rod array composed of 264 fuel rods. Each rod is held in place by spacer grids and top and bottom nozzles. The fuel rods are constructed of zirconium alloy tubing containing uranium dioxide fuel pellets.

The center position in the assembly is reserved for incore instrumentation; the remaining 24 positions in the array are equipped with guide thimbles joined to the grids and the top and bottom nozzles. Depending on assembly position in the core, the guide thimbles are used as core locations for rod cluster control assemblies (RCCAs), neutron source assemblies, and burnable absorber rods (if used).

The bottom nozzle is a box-like structure that serves as a bottom structural element of the fuel assembly and directs the coolant flow to the assembly. The top nozzle assembly functions as the upper structural element of the fuel assembly in addition to providing a partial protective housing for the RCCAs or other components. Each RCCAs consists of a group of individual absorber rods fastened at the top end to a common hub or spider assembly.

The fuel assemblies and RCCAs are considered to be short-lived since they are replaced at regular interval based on plant fuel cycle. Thus, no components of the reactor core system are subject to aging management review.

System Intended Functions

The fuel assemblies assist in directing reactor coolant through the core to achieve acceptable flow distribution and to restrict bypass flow so that the heat transfer performance requirements can be met for all modes of operation. The fuel cladding provides a radioactive fission products barrier. Reactivity control is achieved with the use of control rods and burnable absorber rods. The fuel assemblies are designed to accept control rod insertions to provide reactivity control. Therefore, the reactor core system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the reactor core system are within the scope of license renewal to support fire protection requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the reactor core are included in UFSAR Sections 4.1 and 4.2.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the reactor core.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.1-5 - Reactor Core.

Table 2.3.1-5 Reactor Core

Component Type	Intended Function
None	N/A

2.3.2 Engineered Safety Features

This section addresses scoping and screening results for the following systems:

- Containment spray (Section 2.3.2.1)
- Integrated leak rate test (Section 2.3.2.2)
- Residual heat removal (Section 2.3.2.3)
- Safety injection (Section 2.3.2.4)

2.3.2.1 Containment Spray System

System Description

The purpose of the containment spray system is to maintain the containment ambient pressure by transferring heat from the containment atmosphere to the containment sump, to reduce the quantity of airborne fission product iodine in the containment atmosphere and to establish the sump pH for retention of elemental iodine.

The containment spray system consists of pumps, spray ring headers and nozzles containment spray additive eductors trisodium phosphate (TSP) baskets and the associated piping and valves.

The TSP baskets contain anhydrous TSP to maintain post-LOCA fluid pH levels. The TSP baskets are evaluated as part of the containment structure in Section 2.4.1.

System Intended Functions

The containment spray system maintains the post-accident containment atmospheric pressure below the design limit, establishes the containment sump pH, and limits offsite radiation dose. Containment isolation valves are provided to ensure that containment integrity is maintained. Therefore, the containment spray system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the containment spray system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity attached.

STP UFSAR References

Additional details of the containment spray system are included in UFSAR Sections 3.11.5, 6.1.1.2, 6.2.2, 6.2.4, and 6.5.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the containment spray system are listed below:
LR-STP-CS-5N109F05037#1
LR-STP-CS-5N109F05037#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.2-1 - Containment Spray System

Table 2.3.2-1 Containment Spray System

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Eductor	Pressure Boundary
Flow Element	Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Spray Nozzle	Spray
Tubing	Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.2.2-1, Engineered Safety Features – Summary of Aging Management Evaluation – Containment Spray System.

2.3.2.2 Integrated Leak Rate Test System

System Description

The purpose of the integrated leak rate test system is to provide a means for periodic testing of containment leakage by pressurizing the containment building and monitoring leakage to atmosphere.

The integrated leak rate test system consists of blank flanges, piping, and drain valves.

System Intended Functions

The integrated leak rate test system provides containment integrity by the use of normally installed blank flanges on the containment inboard and outboard integrated leak rate test system penetration piping. Therefore, the integrated leak rate test is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the integrated leak rate test system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural integrity.

STP UFSAR References

Additional details of the integrated leak rate test system are included in UFSAR Sections 6.2.4 and 6.2.6.

License Renewal Boundary Drawings

The license renewal boundary drawing for the integrated leak rate test system is listed below:
LR-STP-IL-5C560F05058

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.2-2 - Integrated Leak Rate Test System.

Table 2.3.2-2 Integrated Leak Rate Test System

Component Type	Intended Function
Blank Flange	Pressure Boundary
Closure Bolting	Pressure Boundary
Piping	Pressure Boundary Structural Integrity (attached)
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.2.2-2, Engineered Safety Features – Summary of Aging Management Evaluation – Integrated Leak Rate Test System.

2.3.2.3 Residual Heat Removal System

System Description

The purpose of the residual heat removal (RHR) system is to transfer decay heat from the RCS to the component cooling water system, maintain cold shutdown conditions during refueling and provide RCS pressure control during plant cooldown or startup. Portions of the RHR system serve as part of the safety injection system during the injection and recirculation phases. The RHR system is also used to transfer refueling water between the RWST and the refueling cavity.

The RHR system consists of heat exchangers, pumps, valves and the associated piping. Inlet lines to the RHR system are connected to the reactor coolant system's hot legs, while the return lines are connected to the RCS cold legs. The return lines also serve as the safety injection system cold leg injection lines.

System Intended Functions

The RHR system removes decay heat from the RCS and maintains cold shutdown conditions during refueling. Portions of the RHR system serve as part of the safety injection system during the injection and recirculation phases. Containment isolation valves are provided to ensure that containment integrity is maintained. Therefore, the residual heat removal system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the residual heat removal system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the residual heat removal system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the residual heat removal system are included in UFSAR Sections 5.4.7, 6.2.2, 6.2.4, and 6.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the residual heat removal system are listed below:
LR-STP-RH-5R169F20000#1
LR-STP-RH-5R169F20000#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.2-3 - Residual Heat Removal System.

Table 2.3.2-3 Residual Heat Removal System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchanger (Residual Heat Removal)	Heat Transfer Pressure Boundary
Heat Exchanger (RHR Pump Seal Water Cooler)	Heat Transfer Pressure Boundary
Insulation	Insulate (Mechanical)
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.2.2-3, Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System.

2.3.2.4 Safety Injection System

System Description

The purpose of the safety injection system (SIS) is to remove decay heat from the reactor core and provide shutdown capability during accident conditions. Reactor core cooling is accomplished in two phases. The short-term injection phase injects borated water from the accumulators and/or refueling water storage tank (RWST) into the RCS. The long-term recirculation phase recirculates water from the containment sumps, through the SIS pumps to the RCS.

The SIS consists of three independent and redundant mechanical subsystems per unit and the refueling water storage tank. Each subsystem consists of one high head safety injection pump, one low head safety pump, one accumulator, and the associated piping and valves. The system also consists of emergency containment sumps, provided with strainer assemblies, to serve as reservoirs to the emergency core cooling system and containment spray system pumps for post-DBA.

System Intended Functions

The SIS provides heat removal, reactivity, inventory and pressure control and maintains the integrity of the reactor coolant pressure boundary. Containment isolation valves are provided to ensure that containment integrity is maintained. The SIS emergency sump strainers filter the recirculated water prior to entering the containment sumps. Therefore, the safety injection system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the safety injection system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the safety injection system are within the scope of license renewal to support fire protection, environmental qualification, and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the safety injection system are included in UFSAR Sections 5.1, 5.4.7, and 6.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the safety injection system are listed below:
LR-STP-SI-5N129F05013#1
LR-STP-SI-5N129F05014#1
LR-STP-SI-5N129F05015#1

LR-STP-SI-5N129F05016#1
LR-STP-SI-5N129F05013#2
LR-STP-SI-5N129F05014#2
LR-STP-SI-5N129F05015#2
LR-STP-SI-5N129F05016#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.2-4 - Safety Injection System.

Table 2.3.2-4 Safety Injection System

Component Type	Intended Function
Accumulator	Pressure Boundary
Bellows	Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Solenoid Valve	Pressure Boundary
Strainer	Filter
Tank	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.2.2-4, Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System.

2.3.3 Auxiliary Systems

This section addresses scoping and screening results for the following systems:

- Fuel handling (Section 2.3.3.1)
- Spent fuel pool cooling and cleanup (Section 2.3.3.2)
- Cranes and hoists (Section 2.3.3.3)
- Essential cooling water and ECW screen wash (Section 2.3.3.4)
- Reactor makeup water (Section 2.3.3.5)
- Component cooling water (Section 2.3.3.6)
- Compressed air (Section 2.3.3.7)
- Primary process sampling (Section 2.3.3.8)
- Chilled water HVAC (Section 2.3.3.9)
- Electrical auxiliary building and control room HVAC (Section 2.3.3.10)
- Fuel handling building HVAC (Section 2.3.3.11)
- Mechanical auxiliary building HVAC (Section 2.3.3.12)
- Miscellaneous HVAC (In Scope) (Section 2.3.3.13)
- Reactor containment building HVAC (Section 2.3.3.14)
- Standby diesel generator building HVAC (Section 2.3.3.15)
- Containment hydrogen monitoring and combustible gas control (Section 2.3.3.16)
- Fire protection (Section 2.3.3.17)
- Standby diesel generator fuel oil storage and transfer (Section 2.3.3.18)
- Chemical and volume control (Section 2.3.3.19)
- Standby diesel generator and auxiliaries (Section 2.3.3.20)
- Nonsafety-related diesel generators and auxiliary fuel oil (Section 2.3.3.21)
- Liquid waste processing (Section 2.3.3.22)
- Radioactive vents and drains (Section 2.3.3.23)
- Nonradioactive waste plumbing drains and sumps (Section 2.3.3.24)
- Oily waste (Section 2.3.3.25)
- Radiation monitoring (area and process) mechanical (Section 2.3.3.26)
- Miscellaneous systems in-scope ONLY for Criterion a(2) (Section 2.3.3.27)
  Includes:
  Boron recycling
  Condensate storage
  Condensate, also includes:
  - BOP chemical feed
  - Condensate polisher
  - Condenser air removal
  Essential cooling pond makeup
  Gaseous waste processing
  Low pressure nitrogen
  MAB plant vent header (radioactive)
  Nonradioactive chemical waste

Open loop auxiliary cooling
Potable water and well water
Secondary process sampling
Solid waste processing
Turbine vents and drains

2.3.3.1 Fuel Handling System

System Description

The purpose of the fuel handling and storage system is to provide a safe, effective means of handling fuel. The fuel storage facilities provide for onsite storage of new and spent fuel assemblies such that a sub-critical arrangement is always maintained under design basis events to prevent accidental criticality of stored fuel assemblies. The fuel handling and storage system contains nonsafety-related handling systems, which carry heavy loads over safety-related components, or over irradiated fuel in the reactor vessel or spent fuel pool.

The fuel handling and storage system consists of equipment and structures utilized in the transporting and handling of the fuel. The storage system includes the new fuel storage racks, the spent fuel pool storage racks and the in-containment storage area (ICSA) racks. The fuel handling system consists of a refueling machine, fuel handling machine, fuel pool bridge crane, fuel transfer system, new fuel elevator, rod cluster control change fixture, and spent and new fuel assembly handling tools. This system also contains the refueling transfer tube, which penetrates containment, through a penetration pipe with expansion bellows. Containment isolation is provided using a blank flange installed on the containment side of the transfer tube.

The penetration expansion bellows are included with the evaluation of the containment building in Section 2.4.1.

System Intended Functions

The fuel handling and storage system provides structural support and safe geometric array storage of fuel assemblies. The fuel handling and storage system also provides containment integrity using a blank flange. Therefore, the fuel handling and storage system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the fuel handling and storage system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural support.

STP UFSAR References

Additional details of the fuel handling system are included in UFSAR Section 9.1.4.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the fuel handling system.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-1 – Fuel Handling System.

Table 2.3.3-1 Fuel Handling System

Component Type	Intended Function
Blank Flange	Pressure Boundary
Closure Bolting	Pressure Boundary
Crane	Structural Support
Elevator	Structural Support
Fuel Handling Equipment	Structural Support
Fuel Storage Racks	Structural Support
Load Test Fixture	Structural Support
Piping	Pressure Boundary Structural Support
Valve	Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-1, Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System.

2.3.3.2 Spent Fuel Pool Cooling and Cleanup System

System Description

The purpose of the spent fuel pool cooling and cleanup system (SFPCCS) is to remove decay heat generated by spent fuel assemblies in the spent fuel pool and the in-containment storage area. The SFPCCS purification loop maintains the purity and optical clarity of the spent fuel cooling and refueling water.

The spent fuel pool cooling system consists of two fuel pool cooling loops with associated pumps, heat exchangers, strainers, piping and valves.

The SFPCCS purification loop consists of two loops with associated pumps, filters, piping and valves. Also included is a fuel pool surface skimmer loop with its associated skimmers, pump, piping and valves.

Various pool, cavity, and canal liners are included with the respective structural evaluations in Section 2.4.

System Intended Functions

The spent fuel pool cooling and cleanup system maintains the fuel storage pool water temperature below prescribed limits. The system provides water inventory over the spent fuel assemblies to mitigate the radiological consequences following a design bases fuel handling accident. The spent fuel pool cooling and cleanup system also contains piping which penetrates containment and contains the necessary containment isolation valves, thereby providing containment integrity. Therefore, the spent fuel pool cooling and cleanup system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the spent fuel pool cooling and cleanup system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

STP UFSAR References

Additional details of the spent fuel pool cooling and cleanup system are included in UFSAR Section 9.1.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the spent fuel pool cooling and cleanup system are listed below:
LR-STP-FC-5R219F05028#1
LR-STP-FC-5R219F05029#1
LR-STP-FC-5R219F05028#2
LR-STP-FC-5R219F05029#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-2 – Spent Fuel Pool Cooling and Cleanup System.

Table 2.3.3-2 Spent Fuel Pool Cooling and Cleanup System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Filter	Leakage Boundary (spatial) Structural Integrity (attached)
Flow Element	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Heat Exchanger (Spent Fuel Pool)	Heat Transfer Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Direct Flow Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Strainer	Filter
Thermowell	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-2, Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System.

2.3.3.3 Cranes and Hoists

System Description

The purpose of the cranes and hoists system is to provide lifting and maneuvering capability in various buildings and structures (e.g. reactor containment building, mechanical auxiliary building, and fuel handling building).

The cranes and hoists system consist of the following cranes including crane-rails, hoists, monorails, and trolleys:

Reactor building polar crane
Cask handling overhead 150-ton crane
Fuel handling building overhead 15/2-ton crane
New fuel handling area overhead five-ton crane
West side reactor containment building jib crane
East side reactor containment building jib crane
Stud tensioner hose hanging trolley
Orbital service bridge
Reactor containment building tugger shaft winch
Diesel generator overhead cranes

System Intended Functions

Portions of the cranes and hoists system contain nonsafety-related handling systems, which carry heavy loads over safety-related components, or over irradiated fuel in the reactor vessel or spent fuel pool. Therefore, the cranes and hoists system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural support.

STP UFSAR References

Additional details of the cranes and hoists system are included in UFSAR Section 9.1.4.3.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the cranes and hoists system.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-3 – Cranes and Hoists System.

Table 2.3.3-3 Cranes and Hoists System

Component Type	Intended Function
Crane	Structural Support
Cranes – Rails	Structural Support
Hoist	Structural Support
Trolley	Structural Support

The AMR results for these component types are provided in Table 3.3.2-3, Auxiliary Systems – Summary of Aging Management Evaluation – Cranes and Hoists System.

2.3.3.4 Essential Cooling Water and ECW Screen Wash System

System Description

The purpose of the essential cooling water (ECW) system is to remove heat from safety-related components and transfer the heat to the essential cooling pond (ultimate heat sink). The purpose of the ECW screen wash system is to minimize debris entering the essential cooling water system using traveling screens. Screen wash booster pumps, which take suction from the ECW pump discharge piping, provide water to wash each traveling water screen.

The ECW system consists of three redundant cooling water loops, each having a pump, a self-cleaning strainer, and associated piping and valves. Each loop cools one set of diesel generator heat exchangers, one component cooling water (CCW) heat exchanger, one essential chiller condenser, and one CCW pump supplementary air handling unit cooler (heat exchanger). The ECW screen wash system consists of traveling screens, screen wash booster pumps, and associated piping and valves.

The diesel generator heat exchangers are included with the evaluation of the standby diesel generator and auxiliaries systems in Section 2.3.3.20. The component cooling water (CCW) heat exchanger is included with the evaluation of the component cooling water system in Section 2.3.3.6. The essential chiller condenser is included with the evaluation of the chilled water HVAC system Section 2.3.3.9. The CCW pump supplementary air-handling unit is included with the evaluation of the mechanical auxiliary building HVAC system Section 2.3.3.12. The CCW pump supplementary air handling unit cooler (heat exchanger) is included with the evaluation of the essential cooling water system and ECW screen wash system in Section 2.3.3.4.

The essential cooling pond is included with the evaluation of the essential cooling water structures in Section 2.4.9.

System Intended Functions

The ECW system provides cooling water to remove heat from safety-related plant components and transfers the heat to the essential cooling pond to accomplish core cooling and safe shutdown. Therefore, the essential cooling water system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the ECW system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the ECW system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the ECW system and ECW screen wash system are included in UFSAR Sections 1.2.2.4.2 and 9.2.1.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the ECW system and the ECW screen wash system are listed below:
LR-STP-EW-5R289F05038#1-1
LR-STP-EW-5R289F05038#1-2
LR-STP-EW-5R289F05038#1-3
LR-STP-EW-5R289F05039#1
LR-STP-EW-5R289F05038#2-1
LR-STP-EW-5R289F05038#2-2
LR-STP-EW-5R289F05038#2-3
LR-STP-EW-5R289F05039#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-4 - Essential Cooling Water and ECW Screen Wash System.

Table 2.3.3-4 Essential Cooling Water and ECW Screen Wash System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Expansion Joint	Pressure Boundary
Filter	Filter Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchanger (CCW Pump Room)	Heat Transfer Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary

Table 2.3.3-4 Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function
Strainer	Pressure Boundary
Strainer Element	Filter
Thermowell	Pressure Boundary
Traveling Screen	Filter
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-4, Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System.

2.3.3.5 Reactor Makeup Water System

System Description

The purpose of the reactor makeup water system is to provide high-purity reactor-grade water to reactor plant systems. Makeup water is provided to the RCS through the chemical volume control system, the spent fuel pool cooling and cleanup system, the component cooling water surge tank, the boron recycle system, and the pressurizer relief tank.

The reactor makeup water system consists of one storage tank, two transfer pumps and associated piping and valves.

System Intended Functions

The reactor makeup water system provides a backup source of makeup water to the component cooling water system surge tank and to the spent fuel pool cooling and cleanup system. Therefore, the reactor water makeup system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the reactor water makeup system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

STP UFSAR References

Additional details of the reactor makeup water system are included in UFSAR Section 9.2.7.

License Renewal Boundary Drawings

The license renewal boundary drawings for the reactor makeup water system are listed below:
LR-STP-RM-5R279F05033#1
LR-STP-RM-5R279F05033#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-5 – Reactor Makeup Water System.

Table 2.3.3-5 Reactor Makeup Water System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Pressure Boundary
Orifice	Leakage Boundary (spatial) Pressure Boundary, Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Tank	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-5, Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Makeup Water System.

2.3.3.6 Component Cooling Water System

System Description

The purpose of the component cooling water system is to transfer heat between potentially radioactive heat sources and the essential cooling water system to reduce the possibility of radioactive contamination to the outside environment. The component cooling water system provides a continuous supply of cooling water to remove residual heat from the reactor during a normal shutdown, to cool the letdown flow to the chemical and volume control system during power operation, to cool various ESF heat loads after a postulated LOCA, and to remove heat from various other plant components during normal operation.

The component cooling water system consists of three 50-percent capacity cooling trains, containing pumps, heat exchangers, and associated piping and valves. A single surge tank divided into three compartments is used for all three trains to accommodate water thermal expansion and contraction.

System Intended Functions

The component cooling water system provides cooling water to various nuclear plant components required for heat removal during safe shutdown or design basis events. Portions of the component cooling water system provide sufficient heat removal from the spent fuel pool heat exchangers to maintain spent fuel temperatures below prescribed limits during all modes of plant operation, including post-accident. The component cooling water system also provides an intermediate fluid barrier between potentially radioactive systems and the essential cooling water system to reduce the possibility of leakage of radioactive contamination to the outside environment. The component cooling water system contains piping, which penetrates the containment, containment isolation valves are provided to ensure that containment integrity is maintained. Therefore, the component cooling water system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the component cooling water system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the component cooling water system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the component cooling water system are included in UFSAR Section 9.2.2.

License Renewal Boundary Drawings

The license renewal drawings for the component cooling water system are listed below:
LR-STP-CC-5R209F05017#1
LR-STP-CC-5R209F05018#1
LR-STP-CC-5R209F05019#1
LR-STP-CC-5R209F05020#1
LR-STP-CC-5R209F05021#1
LR-STP-NL-9R039F05045#1
LR-STP-CC-5R209F05017#2
LR-STP-CC-5R209F05018#2
LR-STP-CC-5R209F05019#2
LR-STP-CC-5R209F05020#2
LR-STP-CC-5R209F05021#2
LR-STP-NL-9R039F05045#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-6 – Component Cooling Water System.

Table 2.3.3-6 Component Cooling Water System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flexible Hoses	Pressure Boundary
Flow Element	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Heat Exchanger (CCW Heat Exchanger)	Heat Transfer Pressure Boundary
Heat Exchanger (Charging Pump Room)	Heat Transfer Pressure Boundary
Heat Exchanger (RCP Bearing Oil Cooler)	Pressure Boundary
Heat Exchanger (RCP Motor Air Cooler)	Pressure Boundary
Heat Exchanger (RCP Thermal Barrier Cooler)	Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

Table 2.3.3-6 Component Cooling Water System (Continued)

Component Type	Intended Function
Pump	Leakage Boundary (spatial) Pressure Boundary
Sight Gauge	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Tank	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-6, Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System.

2.3.3.7 Compressed Air System

System Description

The purpose of the compressed air systems is to provide compressed air to the instrument air, service air, breathing air, and personnel airlock seal air systems.

The compressed air systems consist of the following systems:

<u>Instrument Air System</u>

The purpose of the instrument air system is to provide a continuous supply of filtered, dry, oil-free compressed air for pneumatic instrument operation and control of pneumatic actuators. Credit is taken in the safe shutdown analysis for one compressor in each unit that can be powered from the BOP diesel generator upon loss of power. All components using instrument air fail safe upon loss of air or power.

The portion of the instrument air system within the scope of license renewal consists of an air compressor, an air cooler (heat exchanger), air dyers (tank), moisture and oil separators (tank) air receivers (tank), wet air tanks, and associated instrument air piping and valves. Containment isolation valves are provided to maintain containment integrity.

<u>Service Air System</u>

The purpose of the service air system is to convey dry service air to headers in the reactor containment and the mechanical and electrical auxiliary buildings to serve those stations for operation of air power tools and other services as required. The service air system is nonsafety-related. Safety-related containment isolation valves are provided to maintain containment integrity.

The portion of the service air system within the scope of license renewal consists of containment isolation valves and the attached piping and valves.

<u>Breathing Air System</u>

The purpose of the breathing air system is to provide breathable air for the emergency response personnel. The breathing air system is nonsafety-related. Safety-related containment isolation valves are provided to maintain containment integrity

The portion of the breathing air system within the scope of license renewal consists of breathing air cooling water piping and heat exchangers, containment isolation valves and the attached piping and valves.

<u>Personnel Airlock Seal Air System</u>

The purpose of the personnel airlock seal air system is to provide air to the containment personnel airlock air seals. The personnel airlock seal air system supports containment integrity.

The personnel airlock seal air system consists of air tubing and valves, a pneumatic module containing tubing, and air tanks.

System Intended Functions

Portions of the compressed air system provide containment isolation for instrument air, service air, and breathing air containment penetrations. Portions of the compressed air system provide air the containment personnel airlock door seals to support containment integrity. Therefore, the compressed air system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the compressed air system are within the scope of license renewal as nonsafety-related components affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the compressed air system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the compressed air system are included in UFSAR Sections 3.8.2.1.2 and 9.3.1.

License Renewal Boundary Drawings

The license renewal boundary drawings for the compressed air system are listed below:
LR-STP-IA-5C269F05060#1
LR-STP-IA-5Q109F05041#1
LR-STP-IA-5Q119F05040#1
LR-STP-IA-5Q129F05044#1
LR-STP-IA-6Z011Z45044
LR-STP-IA-6Z011Z45047-1
LR-STP-IA-6Z011Z45047-2
LR-STP-IA-6Z011Z45048
LR-STP-IA-8Q119F00048#1-1
LR-STP-IA-8Q119F00048#1-2
LR-STP-IA-8Q119F00049#1
LR-STP-IA-8Q119F05050#1
LR-STP-IA-8Q119F05054#1
LR-STP-IA-5C269F05060#2
LR-STP-IA-5Q109F05041#2
LR-STP-IA-5Q119F05040#2
LR-STP-IA-5Q129F05044#2
LR-STP-IA-6Z012Z45044
LR-STP-IA-6Z012Z45047-1
LR-STP-IA-6Z012Z45047-2
LR-STP-IA-6Z012Z45048
LR-STP-IA-8Q119F00048#2-1
LR-STP-IA-8Q119F00048#2-2
LR-STP-IA-8Q119F00049#2
LR-STP-IA-8Q119F05050#2
LR-STP-IA-8Q119F05054#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-7 - Compressed Air System.

Table 2.3.3-7 Compressed Air System

Component Type	Intended Function
Accumulator	Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Compressor	Leakage Boundary (spatial) Pressure Boundary
Filter	Filter Pressure Boundary Structural Integrity (attached)
Flexible Hoses	Pressure Boundary
Heat Exchanger (Air)	Heat Transfer Pressure Boundary
Heat Exchanger (BA Compressor Package Lube Oil)	Leakage Boundary (spatial)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Solenoid Valve	Pressure Boundary
Tank	Pressure Boundary
Tubing	Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-7, Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System.

2.3.3.8 Primary Process Sampling System

System Description

The primary process sampling system is comprised of the primary sampling and the post-accident sampling systems.

Primary Sampling System

The purpose of the primary sampling system is to provide the capability to collect samples from various systems manually or remotely and if necessary, redirect samples until conditions are suitable for handling and/or analysis.

The primary sampling system consists of piping and valves. The sample piping originating from containment is isolated by inboard and outboard isolation valves.

Post-Accident Sampling System

The purpose of the post-accident sampling system is to provide a means to obtain representative reactor coolant and containment atmosphere samples. Samples may be obtained during normal plant operation, cooldown, or post-accident conditions without requiring containment building entry.

The post-accident sampling system consists of a containment-sump sample pump, piping, tubing and valves, a sample conditioning rack containing heat exchangers, tubing and valves, a waste collection unit containing tubing, valves, a waste pump and collection tank, and a liquid and gas sample panel containing tubing, valves, pumps and tanks.

System Intended Functions

The primary process sampling system maintains the reactor coolant system pressure boundary. Containment isolation valves are provided to ensure that containment integrity is maintained. Therefore, the primary process sampling system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the primary process sampling system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the primary process sampling system are within the scope of license renewal to support environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the primary process sampling system are included in UFSAR Section 9.3.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the primary process sampling system are listed below:
LR-STP-PS-5Z329Z00045#1

LR-STP-PS-5Z549Z47501#1
LR-STP-PS-9Z329Z00047#1
LR-STP-PS-9Z329Z00048#1
LR-STP-PS-9Z329Z00049#1
LR-STP-PS-5Z329Z00045#2
LR-STP-PS-5Z549Z47501#2
LR-STP-PS-9Z329Z00047#2
LR-STP-PS-9Z329Z00048#2
LR-STP-PS-9Z329Z00049#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-8 - Primary Process Sampling System.

Table 2.3.3-8 Primary Process Sampling System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary
Filter	Leakage Boundary (spatial)
Flow Element	Leakage Boundary (spatial)
Heat Exchanger (PASS Cont Sump Sample)	Leakage Boundary (spatial)
Heat Exchanger (PASS RCS Sample)	Leakage Boundary (spatial)
Heat Exchanger (PASS RHR Sample)	Leakage Boundary (spatial)
Heat Exchanger (PASS Spare Sample)	Leakage Boundary (spatial)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Structural Integrity (attached)
Solenoid Valve	Pressure Boundary
Tank	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-8, Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System.

2.3.3.9 Chilled Water HVAC System

System Description

The purpose of the chilled water HVAC system is to provide chilled water to the various HVAC cooling systems throughout the plant.

The chilled water HVAC system consists of subsystems essential chilled water system, reactor containment building (RCB) chilled water system, mechanical auxiliary building (MAB) chilled water system and the technical service center (TSC) chilled water system.

Essential Chilled Water System

The essential chilled water system provides chilled water to the following safety-related air handling units (AHUs):

- Electrical auxiliary building (EAB) main supply AHUs in the EAB
- Control room envelope AHUs in EAB
- Electrical penetration space emergency AHUs in EAB
- Reactor makeup water pump cubicle AHUs in MAB
- Boric acid transfer pump cubicle AHUs in MAB
- Essential chiller area AHUs in MAB
- Chemical and volume control system pump cubicles AHUs in MAB
- Radiation monitor room AHUs in MAB
- Spent fuel pool pump cubicle AHUs in the Fuel Handling Building (FHB)
- Containment sump isolation valve cubicle AHUs in FHB
- ESF pump cubicles AHUs in FHB

The essential chilled water system consists of piping, valves, essential chiller water pumps, tanks and chillers. Each essential chiller contains a compressor, condenser, evaporator, eductor, lube oil cooler (heat exchanger), lube oil pump, lube oil tank, and associated piping and valves.

The heat exchangers air-handling units listed above are evaluated as part of the electrical auxiliary building and control room HVAC system in Section 2.3.3.10, the fuel handling building HVAC system in Section 2.3.3.11 and the mechanical auxiliary building HVAC in Section 2.3.3.12.

Reactor Containment Building Chilled Water System

The purpose of the RCB chilled water system is to supply chilled water to the reactor containment fan cooler (RCFC) units, during normal plant operations. During accident conditions, the RCFC cooling media is transferred to the closed cooling water system. The RCB chilled water system is nonsafety and performs no safety-related functions.

The RCB chilled water system consists of pumps, tanks, piping and valves.

The heat exchangers for the RCB coolers are evaluated as part of the reactor containment building HVAC system in Section 2.3.3.14.

Mechanical Auxiliary Building Chilled Water System

The purpose of the MAB chilled water system is to supply chilled water to serve the MAB main supply system, supplementary supply system, FHB HVAC supply system, and the breathing air compressor aftercooler. The MAB chilled water system is nonsafety and performs no safety-related functions.

The MAB chilled water system consists of pumps, tanks, piping and valves.

The heat exchangers for MAB coolers are evaluated as part of the mechanical auxiliary building HVAC system in Section 2.3.3.12.

Technical Service Center (TSC) Chilled Water System

The purpose of the TSC chilled water system is to supply chilled water to the TSC AHU cooling coil as well as cooling coils for the main computer room, TSC computer room, normal electrical penetration HVAC, FHB post-accident sampling system area, and MAB radwaste counting room. The TSC chilled water system is nonsafety and performs no safety-related functions.

The TSC chilled water system consists of piping and valves.

System Intended Functions

The chilled water HVAC subsystem, essential chill water system provides cooling to ESF air handling equipment so that a suitable environment can be maintained. Therefore, portions of the chilled water HVAC system are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The following chilled water HVAC subsystems, reactor containment building chilled water system, mechanical auxiliary building chilled water system, and technical service center chilled water system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the chilled water HVAC subsystem, essential chill water system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the chilled water HVAC system are included in UFSAR Sections 9.4.1, 9.4.2, 9.4.3 and 9.4.5.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the chilled water HVAC system are listed below:
LR-STP-CH-3V111V01052
LR-STP-CH-3V111V01053
LR-STP-CH-3V111V01054
LR-STP-CH-3V119V10002#1
LR-STP-CH-3V119V10003#1
LR-STP-CH-3V119V10004#1
LR-STP-CH-5V119V10001#1
LR-STP-CH-5V149V00021#1
LR-STP-CH-6V109V00010#1
LR-STP-CH-6V119V25007#1
LR-STP-CH-3V112V01052
LR-STP-CH-3V112V01053
LR-STP-CH-3V112V01054
LR-STP-CH-3V119V10002#2
LR-STP-CH-3V119V10003#2
LR-STP-CH-3V119V10004#2
LR-STP-CH-5V119V10001#2
LR-STP-CH-5V149V00021#2
LR-STP-CH-6V109V00010#2
LR-STP-CH-6V119V25007#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-9 - Chilled Water HVAC System.

Table 2.3.3-9 Chilled Water HVAC System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Compressor	Pressure Boundary
Eductor	Pressure Boundary
Filter	Pressure Boundary

Table 2.3.3-9 Chilled Water HVAC System (Continued)

Component Type	Intended Function
Flow Element	Leakage Boundary (spatial) Pressure Boundary
Heat Exchanger (AHU Condenser)	Heat Transfer Pressure Boundary
Heat Exchanger (AHU Evaporator)	Heat Transfer Pressure Boundary
Heat Exchanger (Lube Oil Cooler)	Heat Transfer Pressure Boundary
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Pressure Boundary
Separator	Pressure Boundary
Sight Gauge	Leakage Boundary (spatial) Pressure Boundary
Strainer	Leakage Boundary (spatial)
Tank	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Thermowell	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-9, Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System.

2.3.3.10 Electrical Auxiliary Building and Control Room HVAC System

System Description

The purpose of the electrical auxiliary building and control room HVAC system is to supply ventilation air to the electrical auxiliary building main areas, control room envelope, and technical support center.

The electrical auxiliary building and control room HVAC system consists of the electrical auxiliary building main area HVAC system, control room envelope HVAC system and the technical support center HVAC system.

Electrical Auxiliary Building (EAB) Main Area HVAC System

The purpose of the EAB main area HVAC system is to maintain ambient temperature conditions to provide operator comfort and satisfy environmental requirements of equipment. The EAB main area HVAC system maintains the battery room hydrogen concentration level below 2 percent.

The EAB main area HVAC is safety-related except for the heating system, elevator machine room HVAC system, and electrical penetration area normal HVAC system. The system consists three 50-percent capacity equipment trains, each consisting of a main air-handling unit, filter unit, air-handling unit cooling coils (heat exchangers), return and exhaust air fans (blowers), ductwork, dampers and piping.

Control Room (CR) Envelope HVAC System

The purpose of the CR envelope HVAC system is to assure habitability of the control room envelope and permit safe shutdown of the plant. The CR envelope HVAC system maintains ambient temperature conditions to provide operator comfort and to satisfy environmental requirements of equipment, maintains the CR envelope at positive pressure to minimize in leakage of contamination from the outside and to satisfy the design requirements of limits dose to control room personnel following the DBA.

The CR envelope HVAC system is safety-related except for the toilet/kitchen exhaust, heating, and computer room HVAC system. The CR envelope HVAC system consists of three 50-percent capacity redundant equipment trains, each consisting of a main air-handling unit, air-handling unit cooling coils (heat exchangers), return air fan (blower), makeup air filter unit, control room air cleanup filter unit, ductwork, dampers and piping.

TSC HVAC System

The purpose of the TSC HVAC system is to maintain the TSC in a habitable condition by maintaining the ambient temperature conditions.

The TSC is a nonsafety-related system and consists of fire damper within the scope of license renewal.

System Intended Functions

The electrical auxiliary building and control room HVAC system assures habitability of the control room envelope, maintains ambient temperature conditions to provide operator comfort and satisfy environmental requirements of equipment. The system maintains the control room envelope at a positive pressure to minimize any inleakage of possible contamination from the outside, limits the radiation exposure of control room personnel, and maintains the battery room hydrogen concentration level below two percent. Therefore, the electrical auxiliary building HVAC system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the electrical auxiliary building and control room HVAC system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction.

Portions of the electrical auxiliary building and control room HVAC system are within the scope of license renewal to support fire protection, environmental qualification, and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the electrical auxiliary building and control room HVAC system are included in UFSAR Sections 6.4 and 9.4.1.

License Renewal Boundary Drawings

The license renewal boundary drawings for the electrical auxiliary building and control room HVAC system are listed below:
LR-STP-HE-3V119V25001#1
LR-STP-HE-5V119V00020#1
LR-STP-HE-5V119V25000#1
LR-STP-HE-5V119V25002#1
LR-STP-HE-5V119V25003#1
LR-STP-HE-5V119V25004#1
LR-STP-HE-5V119V25005#1
LR-STP-HE-8V119V25006#1
LR-STP-HE-3V119V25001#2
LR-STP-HE-5V119V00020#2
LR-STP-HE-5V119V25000#2
LR-STP-HE-5V119V25002#2
LR-STP-HE-5V119V25003#2
LR-STP-HE-5V119V25004#2
LR-STP-HE-5V119V25005#2
LR-STP-HE-8V119V25006#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-10 – Electrical Auxiliary Building and Control Room HVAC System.

Table 2.3.3-10 Electrical Auxiliary Building and Control Room HVAC System

Component Type	Intended Function
Air Handler	Pressure Boundary
Blower	Pressure Boundary
Closure Bolting	Pressure Boundary
Damper	Fire Barrier Pressure Boundary
Ductwork	Leakage Boundary (spatial) Pressure Boundary
Filter	Pressure Boundary
Flex Connectors	Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchanger (Computer Room AHU)	Leakage Boundary (spatial)
Heat Exchanger (Control Room AHU Cooling Coil)	Heat Transfer Pressure Boundary
Heat Exchanger (Cooling Coils Fins)	Heat Transfer
Heat Exchanger (Cooling Coils Frame)	Structural Support
Heat Exchanger (EAB Main AHU)	Heat Transfer Pressure Boundary
Heat Exchanger (Electrical Penetration Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Penetration Space AHU Cooling Coil)	Leakage Boundary (spatial)
Heater	Pressure Boundary
Piping	Pressure Boundary
Silencer	Pressure Boundary
Tubing	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-10, Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System.

2.3.3.11 Fuel Handling Building HVAC System

System Description

The purpose of the fuel handling building (FHB) HVAC system is to provide continuous air flow across the water surface of the spent fuel pool and control ventilation air flow in the FHB and areas with engineered safety features equipment, ensuring a suitable environment for plant personnel and equipment. The system also maintains slightly negative pressure in the FHB and in the event of an fuel handling accident or LOCA, limits site boundary dose by rerouting the exhaust air through filter units upon a safety injection signal or when airborne radioactivity is detected before the air is directed to the plant main vent stack.

The FHB HVAC system consists of the supply air subsystem, supplementary coolers subsystem, and exhaust air subsystem.

<u>Supply Air Subsystem</u>

The supply air subsystem provides the FHB building with a filtered source of outside air at the proper temperature. The supply air subsystem consists of, ductwork, and dampers.

The air supply louvers are included with the evaluation of the FHB in Section 2.4.8.

<u>Supplementary Coolers Subsystem</u>

The supplementary coolers subsystem provides localized cooling to the emergency core cooling system pump rooms, the spent fuel pool pump cubicles, the containment sump isolation valve cubicles and the nonsafety-related PASS area. The supplementary coolers subsystem consists of air-handling units containing cooling coils (heat exchanges) and circulating fans (blowers), ductwork, and dampers.

<u>Exhaust Air Subsystem</u>

The exhaust air subsystem exhausts ventilation air directly to the plant main vent stack or through filter units upon detection of high radiation or safety injection signal. The exhaust air subsystem consists of exhaust filtration units (filters), exhaust booster fans (blowers), dampers, and ductwork.

System Intended Functions

The FHB HVAC system provides safety-related supplementary cooling to areas that contain safety related equipment, maintains the concentration of radioactive gases in the FHB air below the maximum permissible concentration and maintains a slightly negative pressure in the FHB. Additionally, the FHB HVAC system mitigates the consequences of the fuel handling accident or design basis accident by maintaining the site boundary dose within the guidelines of 10 CFR 100. Therefore, the FHB HVAC system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the FHB HVAC system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction.

Portions of the FHB HVAC system are within the scope of license renewal to support fire protection and station blackout and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the FHB HVAC system are included in UFSAR Sections 6.5.1, 8.3.4, and 9.4.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the FHB HVAC system are listed below:
LR-STP-HF-3V129V00013#1
LR-STP-HF-5V129V00012#1
LR-STP-HF-3V129V00013#2
LR-STP-HF-5V129V00012#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-11 - Fuel Handling Building HVAC System.

Table 2.3.3-11 Fuel Handling Building HVAC System

Component Type	Intended Function
Air Handler	Pressure Boundary
Blower	Pressure Boundary
Closure Bolting	Pressure Boundary
Damper	Fire Barrier Pressure Boundary
Ductwork	Leakage Boundary (spatial) Pressure Boundary
Filter	Pressure Boundary
Flex Connectors	Pressure Boundary
Heat Exchanger (ESF Equipment Room AHU)	Heat Transfer Leakage Boundary (spatial) Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-11, Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System.

2.3.3.12 Mechanical Auxiliary Building HVAC System

System Description

The purpose of the mechanical auxiliary building (MAB) HVAC system is to maintain the MAB ambient air conditions within the design range by controlling the thermal environment, ensuring a suitable environment for plant personnel and equipment. The MAB HVAC system also maintains slightly negative pressure in the MAB to prevent any unmonitored leakage of potentially contaminated air from the building to the environment.

The MAB HVAC system consists of the main supply and exhaust subsystem, the supplementary cubicle coolers subsystem, and the supplementary supply and exhaust subsystem.

Main Supply and Exhaust Subsystem

The purpose of the main supply and exhaust subsystem is to serve cubicles and main areas in the MAB with supply air and exhaust excess air. The supply and exhaust air penetrations through designated fire barriers are equipped with three-hour-rated fire dampers.

The main supply and exhaust system consists of ductwork and tornado and fire dampers.

The air supply louvers are included with the evaluation of the MEB in Section 2.4.5.

Supplementary Cubicle Coolers Subsystem

The purpose of the supplementary cubicle coolers subsystem is to supply supplementary cubicle coolers for safety equipment in the MAB.

The supplementary cooler subsystem consists of blower units containing cooling coils (heat exchangers) and circulating fans (blowers), ductwork, and drain piping.

Supplementary Supply and Exhaust Subsystem

The purpose of the supplementary supply and exhaust subsystem is to serve the locker rooms, miscellaneous offices, and laboratories located in the MAB. The supplementary supply and exhaust system is nonsafety and performs no safety-related functions.

The supplementary supply and exhaust system consists of blower units containing cooling coils (heat exchangers) and drain piping.

The air exhaust louvers are included with the evaluation of the MEB in Section 2.4.5.

System Intended Functions

The MAB HVAC system provides safety-related supplementary cooling to areas that contain safety related equipment. Therefore, the MAB HVAC system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the MAB HVAC system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the MAB HVAC system are within the scope of license renewal to support fire protection, environmental qualification and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the MAB HVAC system are included in UFSAR Sections 1.2.2.12.2 and 9.4.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the MAB HVAC system are listed below:
LR-STP-HM-5V109V00006#1
LR-STP-HM-5V109V00008#1
LR-STP-HM-5V109V00009#1
LR-STP-HM-7V109V00011#1
LR-STP-HM-5V109V00006#2
LR-STP-HM-5V109V00008#2
LR-STP-HM-5V109V00009#2
LR-STP-HM-7V109V00011#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-12 - Mechanical Auxiliary Building HVAC System.

Table 2.3.3-12 Mechanical Auxiliary Building HVAC System

Component Type	Intended Function
Blower	Pressure Boundary Structural Integrity (attached)
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Damper	Fire Barrier Pressure Boundary

Table 2.3.3-12 Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function
Ductwork	Pressure Boundary
Flex Connectors	Pressure Boundary
Heat Exchanger (Aux Bldg HVAC)	Leakage Boundary (spatial)
Heat Exchanger (Boric Acid Transfer Pump Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Charging Pump Valve Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Chemistry Counting Room)	Leakage Boundary (spatial)
Heat Exchanger (CVCS Valve Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Essential Chillers Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Locker Room and Office Area AHU)	Leakage Boundary (spatial)
Heat Exchanger (Rad Mon Room)	Heat Transfer Pressure Boundary
Heat Exchanger (Rad Waste Control Room)	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Heat Exchanger (RMW Storage Tank Room)	Heat Transfer Pressure Boundary
Piping	Leakage Boundary (spatial)

The AMR results for these component types are provided in Table 3.3.2-12, Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System.

2.3.3.13 Miscellaneous HVAC Systems (In Scope)

System Description

The purpose of the miscellaneous HVAC systems (In scope) is to control the thermal environment and provide a suitable environment for personnel and equipment inside the essential cooling water (ECW) structure and fire pump house.

The ECW structure ventilation system consists of supply dampers, ventilation fans (blowers), and exhaust dampers.

The fire pump house HVAC system contains nonsafety-related fire dampers that are within the scope of license renewal for fire protection considerations.

System Intended Functions

The miscellaneous HVAC systems (In Scope) provide safety-related ventilation to the essential cooling water structure. Therefore, the miscellaneous HVAC system (In Scope) is within the scope of license renewal based on the criteria 10 CFR 54.4(a)(1).

Portions of the miscellaneous HVAC system (In Scope) are within the scope of license renewal to support fire protection requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the miscellaneous HVAC systems (In Scope) are included in UFSAR Section 9.4.7.

License Renewal Boundary Drawings

The license renewal boundary drawings for the miscellaneous HVAC systems (In Scope) are listed below:
LR-STP-HZ-5V159V00027#1
LR-STP-HZ-8V340V01014
LR-STP-HZ-5V159V00027#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-13 - Miscellaneous HVAC Systems (In Scope).

Table 2.3.3-13 Miscellaneous HVAC Systems (In Scope)

Component Type	Intended Function
Blower	Pressure Boundary
Closure Bolting	Pressure Boundary
Damper	Fire Barrier Pressure Boundary
Flex Connectors	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-13, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous HVAC Systems (In Scope).

2.3.3.14 Reactor Containment Building HVAC System

System Description

The reactor containment building (RCB) HVAC system consists of the RCB HVAC system and the main steam isolation valve cubicle (building) HVAC system.

<u>Reactor Containment Building (RCB) HVAC System</u>

The purpose of the RCB HVAC system is to maintain the RCB ambient air conditions within the design range, ensuring a suitable environment for equipment operation. The reactor containment fan coolers operate to remove heat from the RCB and mix the containment atmosphere post-LOCA. The RCB HVAC system maintains the containment atmospheric pressure within the design limits, controls the hydrogen concentration below combustible limits post-LOCA, reduces the airborne radioactivity levels in the RCB atmosphere prior to personnel access, purges the tendon gallery tunnel and limits the normal radiation release from the RCB. The reactor containment fan cooler (RCFC) subsystem and the containment purge subsystem provide containment atmosphere continuous mixing and containment purge functions.

The RCB HVAC system consists of ductwork, fans (blowers), dampers, reactor containment fan coolers (RCFC) containing fans (blowers) and cooling coils (heat exchangers), containment isolation valves, piping and valves.

<u>Main Steam Isolation Valve (MSIV) Cubicle (Building) System</u>

The purpose of the MSIV cubicle (building) HVAC system is to maintain the ambient air conditions in the auxiliary feedwater (AFW) pump rooms and MSIV cubicle (building) within the design range, ensuring a suitable environment for equipment operation. The MISV cubicle (building) HVAC system maintains the concrete temperatures in the pipe restraint and penetration areas within the design limits.

The MSIV cubicle (building) HVAC system consists of fans (blowers) and ductwork

System Intended Functions

The RCB HVAC system maintains containment temperature, and pressure within design limits. Containment isolation valves are provided to ensure that containment integrity is maintained. The MSIV cubicle (building) HVAC system maintains the ambient temperature in the AFW pump rooms and the MSIV cubicle (building) within design limits. The reactor containment fan cooler (RCFC) subsystem continuously mixes containment atmosphere to eliminate combustible gas pockets. Therefore, the containment building HVAC system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the RCB HVAC system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the RCB HVAC system are within the scope of license renewal to support fire protection, station blackout and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the RCB HVAC system are included in UFSAR Sections 6.2.2, 6.2.5, 9.4.5, and 9.4.8.

License Renewal Boundary Drawings

The license renewal drawings for the RCB HVAC system are listed below:
LR-STP-HC-5V149V00016#1
LR-STP-HC-5V149V00018#1
LR-STP-HC-5V149V00019#1
LR-STP-HC-5V149V00022#1
LR-STP-HC-5V149V25008#1
LR-STP-HC-5V149V00016#2
LR-STP-HC-5V149V00018#2
LR-STP-HC-5V149V00019#2
LR-STP-HC-5V149V00022#2
LR-STP-HC-5V149V25008#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-14 - Reactor Containment Building HVAC System.

Table 2.3.3-14 Reactor Containment Building HVAC System

Component Type	Intended Function
Blower	Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
CRDM Cooling Shroud	Pressure Boundary
Damper	Fire Barrier Pressure Boundary
Ductwork	Pressure Boundary

Table 2.3.3-14 Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function
Filter	Filter Pressure Boundary
Flex Connectors	Pressure Boundary
Heat Exchanger (Reactor Containment Fan Cooler)	Heat Transfer Pressure Boundary
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Tubing	Pressure Boundary
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-14, Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System.

2.3.3.15 Diesel Generator Building HVAC System

System Description

The purpose of the diesel generator building (DGB) HVAC system is to maintain the ambient room temperature within design limits, ensuring a suitable environment for equipment operation.

The DGB HVAC system consists of the DGB emergency ventilation subsystem and the DGB normal heating and ventilating subsystem.

DGB Emergency Ventilation Subsystem

The purpose of the DGB emergency ventilation subsystem is to maintain ambient room temperature within design limits during standby diesel generator operation.

The DGB emergency ventilation subsystem consists of ductwork, supply fans (blowers), and dampers.

DGB Normal Heating and Ventilating System

The purpose of the DGB normal heating and ventilation system is to maintain the ambient temperature and minimize atmospheric dust levels when the diesel generator is not operating. The DGB normal heating and ventilation system provides a continuous source of fresh air to purge possible oil fumes from the fuel oil storage tank rooms. The DGB normal heating and ventilating subsystem is nonsafety-related and does not perform a safety function.

The DGB normal heating and ventilation system consists of ductwork and fire dampers.

The DGB emergency ventilating system and DGB normal heating ventilating systems share intake and exhaust louvers, which are included with the evaluation of the DGB in Section 2.4.3.

System Intended Functions

The DGB HVAC system maintains the DGB ambient room temperature within design limits. Therefore, the DGB HVAC system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the DGB HVAC system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the DGB HVAC system are included in UFSAR Section 9.4.6.

License Renewal Boundary Drawings

The license renewal drawings for the DGB HVAC system are listed below:
LR-STP-HG-5V139V00015#1
LR-STP-HG-5V139V00015#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-15 - Diesel Generator Building HVAC System.

Table 2.3.3-15 Diesel Generator Building HVAC System

Component Type	Intended Function
Blower	Pressure Boundary
Closure Bolting	Pressure Boundary
Damper	Fire Barrier Pressure Boundary
Ductwork	Pressure Boundary
Flex Connectors	Pressure Boundary
Tubing	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-15, Auxiliary Systems – Summary of Aging Management Evaluation – Diesel Generator Building HVAC System.

2.3.3.16 Containment Hydrogen Monitoring and Combustible Gas Control System

System Description

The purpose of the containment hydrogen monitoring and combustible gas control system is to monitor and control the hydrogen concentration in the containment atmosphere.

The containment hydrogen monitoring and combustible gas control system includes the containment hydrogen monitors, and the electric hydrogen recombiner units. The reactor containment fan cooler (RCFC) subsystem and the containment purge subsystem provide containment atmosphere continuous mixing and containment purge functions. These subsystems are included in the reactor containment building (RCB) HVAC system.

The containment hydrogen monitoring system consists of piping, valves, and two containment hydrogen monitors each containing heat exchangers, sample pumps, flow indicators, sample tubing, and valves. Containment isolation valves are provided to maintain containment integrity.

Electric hydrogen recombiners were installed as a means of controlling containment atmosphere hydrogen concentration. Based upon 10 CFR 50.44, the electric hydrogen recombiners are no longer required for design basis accidents. The electric hydrogen recombiners perform no safety function. These electric hydrogen recombiners are still maintained as environmentally qualified equipment in the EQ program.

The RCFC subsystem and supplementary containment purge subsystem are evaluated as part of the reactor containment building HVAC system in Section 2.3.3.14.

System Intended Functions

The containment hydrogen monitoring and combustible gas control system monitors the containment concentration levels within containment. Containment isolation valves are provided to ensure containment integrity is maintained. Therefore, the containment hydrogen monitoring system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the containment hydrogen monitoring and combustible gas control system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural integrity.

Portions of the containment hydrogen monitoring and combustible gas control system are within the scope of license renewal to support environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the containment hydrogen monitoring and combustible gas control system are included in UFSAR Sections 6.2.5, 7.1.1.5, and 7.6.5.

License Renewal Boundary Drawings

The license renewal boundary drawings for the containment monitoring and combustible gas control system are listed below:
LR-STP-CM-5Z169Z00046#1
LR-STP-CM-5Z169Z00046#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-16 - Containment Hydrogen Monitoring and Combustible Gas Control System.

Table 2.3.3-16 Containment Hydrogen Monitoring and Combustible Gas Control System

Component Type	Intended Function
Closure Bolting	Pressure Boundary Structural Integrity (attached)
Flow Indicator	Pressure Boundary
Heat Exchanger (Hydrogen Analyzer)	Heat Transfer Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Tubing	Pressure Boundary
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-16, Auxiliary Systems – Summary of Aging Management Evaluation – Containment Combustible Gas Control System.

2.3.3.17 Fire Protection System

System Description

The purpose of the fire protection system is to provide the capability to detect, alarm, control, and extinguish any fire or probable combinations of fires which might occur within the plant area. The fire protection system minimizes the effects of fire on plant structures, systems, and components important to safety to the extent that a fire will not compromise the ability to achieve safe shutdown of the plant.

The fire protection system consists of two 300,000 gallon storage tanks, diesel engine-driven fire water pumps, diesel fire pump jacket water heat exchangers, hydrants, hose stations, sprinklers, deluge valves, and associated piping and valves.

The fire detection and actuation portion of the system is evaluated as part of the electrical and instrument and control system in Section 2.5. Except where specifically identified, fire dampers are evaluated as part of the assigned HVAC systems. Other passive fire barriers are evaluated as part of their specific structures in Section 2.4.

System Intended Functions

The fire protection system provides containment isolation for containment penetration and fire suppression for the fuel handling building exhaust filter units. Therefore, the fire protection system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the fire protection system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the fire protection system are within the scope of license renewal to support fire protection requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the fire protection system are included in UFSAR Section 9.5.1.

License Renewal Boundary Drawings

The license renewal boundary drawings for the fire protection system are listed below:
LR-STP-HF-3V129V00013#1
LR-STP-FP-7Q270F00006
LR-STP-FP-7Q270F00014
LR-STP-FP-5Q279F05047#1
LR-STP-FP-7Q271F00046
LR-STP-FP-7Q271F05064
LR-STP-FP-7Q279F00047#1
LR-STP-FP-7Q272F00046
LR-STP-FP-7Q272F05064

LR-STP-FP-7Q279F05049#1
LR-STP-FP-7Q279F05053#1
LR-STP-FP-7Q279F05056#1
LR-STP-HF-3V129V00013#2
LR-STP-FP-7Q279F00047#2
LR-STP-FP-5Q279F05047#2
LR-STP-FP-7Q279F05049#2
LR-STP-FP-7Q279F05053#2
LR-STP-FP-7Q279F05056#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-17 - Fire Protection System.

Table 2.3.3-17 Fire Protection System

Component Type	Intended Function
Closure Bolting	Pressure Boundary Structural Integrity (attached)
Damper	Fire Barrier Pressure Boundary
Filter (Halon)	Filter Pressure Boundary
Flame Arrestor	Pressure Boundary
Flexible Hoses	Pressure Boundary
Flow Element	Pressure Boundary
Heat Exchanger (Diesel Fire Pump Jacket Water)	Pressure Boundary
Hydrant	Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Spray Structural Integrity (attached)
Piping (Halon)	Pressure Boundary Spray
Pump	Pressure Boundary
Solenoid Valve	Pressure Boundary
Solenoid Valve (Halon)	Pressure Boundary

Table 2.3.3-17 Fire Protection System (Continued)

Component Type	Intended Function
Sprinkler Head	Pressure Boundary Spray
Strainer	Pressure Boundary Structural Integrity (attached)
Strainer Element	Filter
Tank	Pressure Boundary
Tubing	Pressure Boundary
Valve	Pressure Boundary Structural Integrity (attached)
Valve (Halon)	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-17, Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System.

2.3.3.18 Standby Diesel Generator Fuel Oil Storage and Transfer System

System Description

The purpose of the standby diesel generator fuel oil storage and transfer system is to provide fuel oil for continuous operation of standby diesel generators at engineered safety features load requirements for at least seven days. The standby diesel generator fuel oil storage and transfer system consists of fuel oil storage tanks, fuel oil drain tanks, flame arresters, pumps and associated piping and valves.

System Intended Functions

The standby diesel generator fuel oil storage and transfer system provides fuel oil to the standby diesel generators. Therefore, the standby diesel generator fuel oil storage and transfer system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the standby diesel generator fuel oil storage and transfer system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the standby diesel generator fuel oil storage and transfer system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the standby diesel generator fuel oil storage and transfer system are included in UFSAR Section 9.5.4.

License Renewal Boundary Drawings

The license renewal boundary drawings for the standby diesel generator fuel oil storage and transfer system are listed below:
LR-STP-DO-5Q159F00045#1-1
LR-STP-DO-5Q159F00045#1-2
LR-STP-DO-5Q159F00045#2-1
LR-STP-DO-5Q159F00045#2-2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-18 – Standby Diesel Generator Fuel Oil Storage and Transfer System.

Table 2.3.3-18 Standby Diesel Generator Fuel Oil Storage and Transfer System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Filter	Filter Pressure Boundary
Flame Arrestor	Pressure Boundary
Flexible Hoses	Pressure Boundary
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Sight Gauge	Leakage Boundary (spatial) Structural Integrity (attached)
Strainer	Filter Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

Table 2.3.3-18 Standby Diesel Generator Fuel Oil Storage and Transfer System (Continued)

Component Type	Intended Function
Tank	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Tubing	Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-18, Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System.

2.3.3.19 Chemical and Volume Control System

System Description

The purpose of the chemical and volume control system (CVCS) is to maintain the water inventory within the RCS, provide seal water injection flow to the reactor coolant pumps, vary the boron concentration of the RCS, maintain required RCS water chemistry, activity levels and soluble chemical neutron absorber concentration and provide reactor coolant purification.

The CVCS consists of the charging, letdown and seal water subsystem, the reactor coolant purification and chemistry control subsystem, the reactor makeup control subsystem and the boron thermal regeneration subsystem.

<u>Charging, letdown and seal water subsystem</u>

The purpose of the charging, letdown and seal water subsystem is to maintain a programmed water level in the pressurizer, thus maintaining a proper reactor coolant inventory during all phases of plant operation. This is achieved by means of a continuous feed-and-bleed process during which the feed rate is automatically controlled, based on the pressurizer water level. Charging pumps are provided to take suction from the volume control tank and return the purified reactor coolant to the RCS. A portion of the charging flow is directed to the reactor coolant pumps (RCP) seal water injection.

<u>Reactor coolant purification and chemistry control subsystem</u>

The purpose of the reactor coolant purification and chemistry control subsystem is to maintain desired reactor coolant system water chemistry conditions for radioactivity control.

The pH control chemical employed is lithium hydroxide introduced into the RCS via the charging flow. Dissolved hydrogen is employed to control and scavenge oxygen produced due to radiolysis of water in the core region. A sufficient partial pressure of hydrogen is maintained in the VCT so that the specified concentration of hydrogen is maintained in the reactor coolant. Mixed bed demineralizers are provided in the letdown line to cleanup the letdown flow of ionic corrosion products and certain fission products.

Reactor makeup control subsystem

The purpose of the reactor makeup control subsystem is to provide makeup water to the RCS. The reactor makeup control system is used to maintain proper reactor coolant inventory and soluble neutron absorber (boric acid) concentration. In addition, for emergency boration and makeup, the redundant capability exists to supply borated water directly from the refueling water storage tank to the suction of the charging pumps. Automatic makeup compensates for minor leakage of reactor coolant without causing significant changes in the reactor coolant boron concentration.

Boron thermal regeneration subsystem

The purpose of the boron thermal regeneration subsystem is to adjust boron concentration when needed. Downstream of the mixed bed demineralizers, the letdown flow can be diverted to the BTRS when boron concentration changes are desired. Although the boron thermal regeneration system is primarily designed to compensate for xenon transients occurring during load follow, it can also be used to handle boron changes during other modes of plant operation.

The CVCS consists of various tanks, accumulators, bellows, chillers, pumps, heat exchangers, demineralizers, piping, and valves necessary to control the chemistry, volume, and boric acid content of the reactor coolant.

System Intended Functions

The chemical volume and control system maintains reactor coolant system (RCS) pressure boundary, provides boration and makeup into the RCS, supplies seal water injection flow to the reactor coolant pump seals and provides for containment isolation. Therefore, the chemical volume and control system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the chemical volume and control system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural integrity and spatial interaction.

Portions of the chemical volume and control system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the chemical and volume control system are included in UFSAR Section 9.3.4 and Table 6.2.4-1.

License Renewal Boundary Drawings

The license renewal boundary drawings for the chemical and volume control system are listed below:
LR-STP-CV-2R171F05062
LR-STP-CV-2R172F05062
LR-STP-CV-5R179F05005#1
LR-STP-CV-5R179F05006#1
LR-STP-CV-5R179F05007#1
LR-STP-CV-5R179F05008#1
LR-STP-CV-5R179F05009#1
LR-STP-CV-5R179F05005#2
LR-STP-CV-5R179F05006#2
LR-STP-CV-5R179F05007#2
LR-STP-CV-5R179F05008#2
LR-STP-CV-5R179F05009#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-19 – Chemical and Volume Control System.

Table 2.3.3-19 Chemical and Volume Control System

Component Type	Intended Function
Accumulator	Pressure Boundary
Bellows	Pressure Boundary
Chiller	Leakage Boundary (spatial) Structural Integrity (attached)
Class 1 Piping <= 4in	Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Demineralizer	Pressure Boundary
Filter	Pressure Boundary
Flexible Hoses	Leakage Boundary (spatial) Structural Integrity (attached)

Table 2.3.3-19 Chemical and Volume Control System (Continued)

Component Type	Intended Function
Flow Element	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Indicator	Leakage Boundary (spatial)
Heat Exchanger (Concentrated Boric Acid Sample Cooler)	Leakage Boundary (spatial)
Heat Exchanger (CVCS BTRS Letdown Chiller)	Leakage Boundary (spatial) Structural Integrity (attached)
Heat Exchanger (CVCS BTRS Letdown Reheat)	Pressure Boundary
Heat Exchanger (CVCS BTRS Moderating)	Leakage Boundary (spatial) Structural Integrity (attached)
Heat Exchanger (CVCS Excess Letdown)	Pressure Boundary
Heat Exchanger (CVCS Letdown)	Pressure Boundary
Heat Exchanger (CVCS Regenerative)	Pressure Boundary
Heat Exchanger (CVCS Seal Water Return)	Heat Transfer Pressure Boundary
Heat Exchanger (Lube Oil Cooler)	Heat Transfer Leakage Boundary (spatial) Pressure Boundary
Insulation	Insulate (Mechanical)
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Pressure Boundary
Strainer	Leakage Boundary (spatial)
Tank	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Thermowell	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

Table 2.3.3-19 Chemical and Volume Control System (Continued)

Component Type	Intended Function
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-19, Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System.

2.3.3.20 Standby Diesel Generator and Auxiliaries

System Description

The purpose of the standby diesel generator system is to provide onsite standby electrical power for Class 1E loads in the event that the offsite power sources become unavailable.

The standby diesel generator system contains several subsystems. These include the diesel generator cooling water system, diesel generator starting system, diesel generator lubrication system, diesel generator combustion air intake and exhaust system.

<u>Diesel Generator Cooling Water System</u>

The purpose of the diesel generator cooling water system is to circulate sufficient quantities of cooling water to dissipate heat given off by the air coolers, governor oil and lube oil cooler, and engine water jackets, under full load conditions.

The system consists of engine driven jacket water pumps, electric jacket water pumps, jacket water heat exchanger, lube oil heat exchangers, governor oil heat exchanger, heaters, associated piping and valves.

<u>Diesel Generator Starting System</u>

The purpose of the diesel generator starting system is to start the diesel engine using compressed air. Each diesel generator is provided with two starting air systems.

The diesel starting system consists of air dryers, air accumulators, associated piping and valves.

<u>Diesel Generator Lubrication System</u>

The purpose of the diesel generator lubrication system is to provide a self-contained lube oil system for each diesel generator engine.

The system consists of engine-driven lube oil pumps, electric lube oil pumps, lube oil filters and strainers, lube oil heat exchangers, governor oil heat exchanger, associated piping and valves.

Diesel Generator Combustion Air Intake and Exhaust System

The purpose of the diesel generator combustion air intake and exhaust system is to supply the diesel generator engine with a sufficient quantity of combustion air and then discharge the exhaust gases.

The diesel generator combustion air intake and exhaust system consists of combustion air intake filters and silencers, exhaust silencers, combustion air manifold, exhaust manifolds, turbocharger, associated piping and valves.

Fuel Supply

The fuel supply to the diesel generators is evaluated as part of the standby diesel generator fuel oil storage and transfer system in Section 2.3.3.18.

System Intended Functions

The standby diesel generator system provides onsite emergency AC power for equipment that acts to shutdown the reactor and maintains it in a safe shutdown condition. Therefore, the standby diesel generator system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the standby diesel generator system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the standby diesel generator system are within the scope of license renewal to support fire protection and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the standby diesel generator and auxiliaries systems are included in UFSAR Sections 8.3.1.1, 9.5.4, 9.5.5, 9.5.6, 9.5.7, and 9.5.8.

License Renewal Boundary Drawings

The license renewal boundary drawings for the standby diesel generator and auxiliaries systems are listed below:
LR-STP-DG-5Q159F22540#1
LR-STP-DG-5Q159F22541#1
LR-STP-DG-5Q159F22542#1

LR-STP-DG-5Q159F22543#1
LR-STP-DG-5Q159F22544#1
LR-STP-DG-5Q159F22545#1
LR-STP-DG-5Q159F22546#1
LR-STP-DG-5Q159F22540#2
LR-STP-DG-5Q159F22541#2
LR-STP-DG-5Q159F22542#2
LR-STP-DG-5Q159F22543#2
LR-STP-DG-5Q159F22544#2
LR-STP-DG-5Q159F22545#2
LR-STP-DG-5Q159F22546#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3 - 20 – Standby Diesel Generator and Auxiliaries Systems.

Table 2.3.3-20 Standby Diesel Generator and Auxiliaries Systems

Component Type	Intended Function
Accumulator	Pressure Boundary Structural Integrity (attached)
Blower	Heat Transfer Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Dryer	Structural Integrity (attached)
Expansion Joint	Pressure Boundary
Filter	Filter Pressure Boundary Structural Integrity (attached)
Flexible Hoses	Structural Integrity (attached)
Heat Exchanger (DG Governor Oil Cooler)	Heat Transfer Pressure Boundary
Heat Exchanger (DG Jacket Water)	Heat Transfer Pressure Boundary
Heat Exchanger (DG Lube Oil)	Heat Transfer Pressure Boundary
Heat Exchanger (DG Turbo Air Intercooler)	Heat Transfer Pressure Boundary
Heater	Pressure Boundary

Table 2.3.3-20 Standby Diesel Generator and Auxiliaries Systems (Continued)

Component Type	Intended Function
Orifice	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached) Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Sight Gauge	Pressure Boundary
Silencer	Pressure Boundary
Solenoid Valve	Pressure Boundary Structural Integrity (attached)
Strainer	Filter Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Thermowell	Pressure Boundary Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-20, Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries Systems.

2.3.3.21 Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System

System Description

The nonsafety-related diesel generators and auxiliary fuel oil system consists of the balance of plant (BOP) diesel generators, the technical support center (TSC) diesel generators, the diesel fire pump engines, and the auxiliary fuel oil subsystem.

The purpose of the nonsafety-related diesel generators and auxiliary fuel oil system is to provide electrical power to selected balance of plant electrical loads such as turbine auxiliary loads, non-Class 1E battery chargers, ventilating fans, positive displacement charging pump and instrument air compressors in the event of loss of power. The diesel fire pump engines provide the driver for the fire pumps. The auxiliary fuel oil subsystem supplies diesel fuel oil to the BOP diesels, the TSC diesels and the fire pump diesels.

The TSC diesel generators do not perform any license renewal functions and therefore not within the scope of license renewal.

The BOP diesel generators consist of the two diesel generators containing exhaust silencers, lube oil tanks, and associated piping and valves.

The fire pump diesel engine consists of a diesel engine. The fire pumps are included with the evaluation of the fire protection system in Section 2.3.3.17.

The auxiliary fuel oil subsystem consists of diesel fuel oil tanks, flame arrestors, and associated piping and valves.

System Intended Functions

Portions of the nonsafety-related diesel generators and auxiliary fuel oil system are within the scope of license renewal to support fire protection requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the nonsafety-related diesel generators and auxiliary fuel oil system are included in UFSAR Sections 9.3.1.3.2, 9.5.1.2.1, and 9.5.10.

License Renewal Boundary Drawings

The license renewal drawing for the nonsafety-related diesel generators and auxiliary fuel oil system is listed below:
LR-STP-DB-6Q170F00011-1

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-21 - Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System.

Table 2.3.3-21 Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Expansion Joint	Pressure Boundary
Flame Arrestor	Pressure Boundary
Flexible Hoses	Pressure Boundary
Piping	Pressure Boundary
Sight Gauge	Pressure Boundary
Silencer	Pressure Boundary
Tank	Pressure Boundary
Tubing	Pressure Boundary
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-21, Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System.

2.3.3.22 Liquid Waste Processing System

System Description

The purpose of the liquid waste processing system is to collect and process radioactive liquid wastes generated from plant operation and maintenance, and to reduce radioactivity and chemical concentrations to levels acceptable for discharge or recycle. Specifically, the liquid waste processing system handles potentially radioactive floor and equipment drains, laundry, chemical and condensate polishing regeneration wastes.

The liquid waste processing system consists of tanks, pumps, reactor coolant drain tank heat exchangers, an attemperator, filters, strainers, piping and valves

System Intended Functions

The liquid waste system provides containment isolation for the discharge piping from the reactor coolant drain tank. Therefore, the liquid waste system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the liquid waste system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the liquid waste system are within the scope of license renewal to support environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the liquid waste processing system are included in UFSAR Sections 3.1.2.6.2.3 and 11.2.

License Renewal Boundary Drawings

The license renewal drawings for the liquid waste processing system are listed below:
LR-STP-PS-5Z549Z47501#1
LR-STP-CV-5R179F05005#1
LR-STP-DW-5S199F05034#1
LR-STP-RC-5R149F05001#1
LR-STP-RC-5R149F05003#1
LR-STP-WL-5R309F05022#1
LR-STP-WL-5R309F05027#1
LR-STP-WL-7R309F05023#1
LR-STP-WL-7R309F05024#1
LR-STP-WL-7R309F05026#1
LR-STP-WL-7R309F90000#1
LR-STP-WL-7R309F90001#1
LR-STP-WL-7R309F90017#1
LR-STP-WL-7R309F90018#1
LR-STP-WL-7R309F90020#1
LR-STP-WL-7R309F90021#1
LR-STP-WS-6R329F05048#1
LR-STP-WS-6R329F05059#1
LR-STP-PS-5Z549Z47501#2
LR-STP-CV-5R179F05005#2
LR-STP-DW-5S199F05034#2
LR-STP-RC-5R149F05001#2
LR-STP-RC-5R149F05003#2
LR-STP-WL-5R309F05022#2

LR-STP-WL-5R309F05027#2
LR-STP-WL-7R309F05023#2
LR-STP-WL-7R309F05024#2
LR-STP-WL-7R309F05026#2
LR-STP-WL-7R309F90000#2
LR-STP-WL-7R309F90001#2
LR-STP-WL-7R309F90017#2
LR-STP-WL-7R309F90018#2
LR-STP-WL-7R309F90020#2
LR-STP-WL-7R309F90021#2
LR-STP-WS-6R329F05048#2
LR-STP-WS-6R329F05059#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-22 - Liquid Waste Processing System.

Table 2.3.3-22 Liquid Waste Processing System

Component Type	Intended Function
Attemperator	Leakage Boundary (spatial)
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Filter	Leakage Boundary (spatial) Structural Integrity (attached)
Flow Element	Leakage Boundary (spatial) Structural Integrity (attached)
Heat Exchanger (RCDT Heat Exchanger)	Leakage Boundary (spatial) Structural Integrity (attached)
Orifice	Leakage Boundary (spatial) Structural Integrity (attached)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached) Structural Support
Pump	Leakage Boundary (spatial) Structural Integrity (attached)
Sample Vessel	Leakage Boundary (spatial)
Sight Gauge	Leakage Boundary (spatial)
Strainer	Leakage Boundary (spatial)

Table 2.3.3-22 Liquid Waste Processing System (Continued)

Component Type	Intended Function
Tank	Leakage Boundary (spatial) Structural Integrity (attached)
Thermowell	Leakage Boundary (spatial) Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-22, Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System.

2.3.3.23 Radioactive Vents and Drains System

System Description

The purpose of the radioactive vent and drain system is to collect and transport radioactive or potentially radioactive water from equipment and floor drains and collect and transport radioactive gases from various tanks and equipment for release into the plant main exhaust duct. Class 1E leak detection instrumentation provides for leak detection for the safety injection system and containment spray system pump compartment sumps to alert the operators of inleakage or flooding.

The radioactive vent and drain system includes the radioactive drain subsystem and the radioactive vent header subsystem.

<u>Radioactive drain subsystem</u>

The purpose of the radioactive drain subsystem is to collect and transport radioactive or potentially radioactive water from equipment and floor drains in the containment building, the mechanical auxiliary building, the fuel-handling building, and potentially radioactive drains from the turbine generator building to various tanks in the liquid waste processing system for processing. Floor drains installed throughout safety-related buildings are sized to remove the expected water flows of the fixed fire protection systems and hose streams from the standpipe systems.

<u>Radioactive vent header subsystem</u>

The purpose of the radioactive vent header is to collect and transport radioactive gases from various tanks and equipment for release into the plant main exhaust duct.

The radioactive vent and drain system consists of containment isolation valves, containment sump pumps, fuel handling building sump pumps and tanks, associated piping and valves.

System Intended Functions

The radioactive vent and drain system provides containment isolation for the discharge piping from the containment normal sump and provides leak detection to detect inleakage or flooding of the safety injection system and containment spray system pump compartment. Therefore, the radioactive vent and drain system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the radioactive vent and drain system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the radioactive vent and drain system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the radioactive vents and drains system are included in UFSAR Sections 6.2.4, 9.3.3, and Table 3.2.A-1.

License Renewal Boundary Drawings

The license renewal drawings for the radioactive vents and drains system are listed below:
LR-STP-ED-5Q069F05030#1
LR-STP-ED-7Q069F90010#1
LR-STP-ED-5Q069F90011#1
LR-STP-ED-7Q069F90012#1
LR-STP-ED-7Q069F90013#1
LR-STP-ED-7Q069F90014#1
LR-STP-ED-7Q069F90015#1
LR-STP-ED-7Q069F90016#1
LR-STP-ED-9Q069F90026#1
LR-STP-VE-9Q069F05036#1
LR-STP-HC-5V149V00016#1
LR-STP-ED-5Q069F05030#2
LR-STP-ED-7Q069F90010#2
LR-STP-ED-5Q069F90011#2
LR-STP-ED-7Q069F90012#2
LR-STP-ED-7Q069F90013#2
LR-STP-ED-7Q069F90014#2
LR-STP-ED-7Q069F90015#2

LR-STP-ED-7Q069F90016#2
LR-STP-ED-9Q069F90026#2
LR-STP-VE-9Q069F05036#2
LR-STP-HC-5V149V00016#2
LR-STP-HF-3V129V00013#1
LR-STP-HF-3V129V00013#2
LR-STP-HF-5V129V00012#1
LR-STP-HF-5V129V00012#2
LR-STP-HM-5V109V00008#1
LR-STP-HM-5V109V00008#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-23 - Radioactive Vents and Drains System.

Table 2.3.3-23 Radioactive Vents and Drains System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Structural Integrity (attached)
Tank	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-23, Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System.

2.3.3.24 Nonradioactive Waste Plumbing Drains and Sumps System

System Description

The purpose of the nonradioactive waste plumbing drains and sumps system is to collect nonradioactive liquid wastes through floor drains and sumps. Floor drains installed throughout safety-related buildings are sized to remove the expected water flows of the fixed fire protection systems and hose streams from the standpipe systems. The nonradioactive waste plumbing drains and sumps system is nonsafety-related and performs no safety function.

Drains are designed such that there will be no inadvertent introduction of external floodwater through these lines into seismic Category I structures. Check valves are utilized to prevent backflow from external flooding.

The nonradioactive waste plumbing drains and sumps system consists of drain piping, valves and sump pumps.

System Intended Functions

Portions of the nonradioactive waste plumbing drains and sumps system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the nonradioactive waste plumbing drains and sumps system are within the scope of license renewal to support fire protection requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the nonradioactive waste plumbing drains and sumps system are included in UFSAR Sections 3.4.1, 3.4.3, and 9.3.3.

License Renewal Boundary Drawings

The license renewal drawings for the nonradioactive waste plumbing drains and sumps system are listed below:
LR-STP-DR-5V129V00014#1
LR-STP-DR-6Q069F20005#1
LR-STP-DR-9M069B0163
LR-STP-DR-9M069B0141
LR-STP-HE-5V119V25000#1
LR-STP-HF-5V129V00012#1
LR-STP-HM-5V109V00006#1
LR-STP-DR-5V129V00014#2

LR-STP-DR-6Q069F20005#2
LR-STP-HE-5V119V25000#2
LR-STP-HF-5V129V00012#2
LR-STP-HM-5V109V00006#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-24 - Nonradioactive Waste Plumbing Drains and Sumps System.

Table 2.3.3-24 Nonradioactive Waste Plumbing Drains and Sumps System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Structural Integrity (attached)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-24, Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing Drains and Sumps System.

2.3.3.25 Oily Waste System

System Description

The purpose of the oily waste system is to remove potentially oil-contaminated wastes from the turbine-generator building, isolation valve cubicle (building), diesel generator building, lighting diesel generator building, mechanical and electrical auxiliary building, firewater pump house, machine shop, fuel oil storage tank retention basin, separated oil storage tank retention basin, and yard transformer pits. The wastes are transferred to the oily waste treatment facility (OWTF) for processing. Wastes collected in the OWTF are processed to remove oil from the wastes and release effluent of a quality consistent with regulatory requirements. The oily waste system is nonsafety-related and performs no safety function.

The oily waste system within the diesel generator building and the isolation valve cubicle (building) are designed with check valves to prevent introduction of external flood water into these Category I structures.

Those portions of the oily waste system located within the diesel generator building and the isolation valve cubicle (building) are within the scope of license renewal. The oily waste system consists of sump pumps, piping and valves.

System Intended Functions

Portions of the oily waste system are within the scope of license renewal to support fire protection based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the oily waste system are included in UFSAR Sections 9.3.3, and Table 9.3-14.

License Renewal Boundary Drawings

The license renewal drawings for the oily waste system are listed below:
LR-STP-OW-9G060F10011
LR-STP-OW-9G069F10005#1
LR-STP-OW-9G069F10006#1
LR-STP-OW-9G069F20017#1
LR-STP-OW-9G069F10005#2
LR-STP-OW-9G069F10006#2
LR-STP-OW-9G069F20017#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-25 – Oily Waste System.

Table 2.3.3-25 Oily Waste System

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Piping	Pressure Boundary
Pump	Pressure Boundary
Valve	Pressure Boundary

The AMR results for these component types are provided in Table 3.3.2-25, Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste System.

2.3.3.26 Radiation Monitoring (area and process) Mechanical System

System Description

The purpose of the radiation monitoring (area and process) mechanical system is to monitor, record, and control the release of radioactive materials that may be generated. The radiation monitoring (area and process) mechanical system also provides engineered safety feature (ESF) actuation signals to mitigate radiological releases or accidents. The system is composed of process, effluent, and area radiation monitoring systems.

The radiation monitoring (area and process) mechanical system consists of piping, tubing, and valves.

System Intended Functions

The radiation monitoring (area and process) mechanical system contains portions which are safety-related and perform a containment isolation function. Therefore, the radiation monitoring (area and process) mechanical system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the radiation monitoring (area and process) mechanical system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural integrity.

STP UFSAR References

Additional details of the radiation monitoring (area and process) mechanical system are included in UFSAR Section 11.5.

License Renewal Boundary Drawings

The license renewal drawings for the radiation monitoring (area and process) mechanical system are listed below:
LR-STP-HF-3V129V00013#1
LR-STP-HE-5V119V25003#1
LR-STP-RA-5V149V00017#1
LR-STP-HC-5V149V00019#1
LR-STP-HF-3V129V00013#2
LR-STP-HE-5V119V25003#2
LR-STP-RA-5V149V00017#2
LR-STP-HC-5V149V00019#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-26 – Radiation Monitoring (area and process) Mechanical System.

Table 2.3.3-26 Radiation Monitoring (area and process) Mechanical System

Component Type	Intended Function
Closure Bolting	Pressure Boundary Structural Integrity (attached)
Flexible Hoses	Pressure Boundary
Flow Element	Pressure Boundary
Piping	Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Sight Gauge	Pressure Boundary
Tubing	Pressure Boundary Structural Integrity (attached)
Valve	Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-26, Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System.

2.3.3.27 Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2)

Systems within the scope of license renewal based upon the criterion of 10 CFR 54.4(a)(2) were identified using the methods described in Section 2.1.2.2. A review of mechanical systems was performed to identify nonsafety-related systems or nonsafety-related portions of safety-related systems with the potential for adverse spatial interaction with safety-related systems or components. Components subject to aging management review due only to scoping criterion 10 CFR 54.4(a)(2) are evaluated in this section.

The following systems are within the scope of license renewal only based on the criterion of 10 CFR 54.4(a)(2):

- Boron recycling
- Condensate
- Condensate storage
- Essential cooling pond makeup
- Gaseous waste processing
- Low pressure nitrogen
- MAB plant vent header (radioactive)
- Nonradioactive chemical waste
- Open loop auxiliary cooling

- Potable water and well water
- Secondary process sampling
- Solid waste processing
- Turbine vents and drains

System Descriptions/System Intended Functions

Boron Recycling System

The purpose of the boron recycling system is to recycle reactor coolant for reuse of boric acid and makeup water. The boron recycling system is nonsafety-related and performs no safety function.

The boron recycling system consists of nonsafety-related recycle heat exchanger evaporator, reagent tank, associated piping, and valves located within safety related areas and connected to safety-related components.

Portions of the boron recycling system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Condensate System

The purpose of the condensate system is to provide collection of condensate from the exhaust steam of main turbines, feedwater pump turbines and the steam cycle drains in the main condenser hotwell. The condensate system is nonsafety-related and performs no safety function.

The condensate system consists of the following systems:

- Condensate
- Balance of plant (BOP) chemical feed
- Condensate polisher
- Condenser air removal

The condensate system consists of nonsafety-related piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the condensate system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Condensate Storage System

The purpose of the condensate storage system is to provide makeup water to the condenser hotwell and receive reject water from the condensate system during startup, shutdown, hot standby, and normal power generation operations. The condensate storage system is nonsafety-related and provides no safety function.

The condensate storage system consists of nonsafety-related piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the condensate storage system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Essential Cooling Pond Makeup System

The purpose of the essential cooling pond makeup system is to provide a secondary source of makeup to the essential cooling pond from the main cooling water reservoir. The primary source of makeup is from the onsite freshwater well system. The essential cooling pond makeup system is nonsafety-related and performs no safety function. The essential cooling pond makeup system is not required for the essential cooling pond to perform its intended function.

The essential cooling pond makeup system consists of nonsafety-related discharge piping and valves from the essential cooling water sump pumps that are located within safety-related areas.

Portions of the essential cooling pond makeup system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Gaseous Waste Processing System

The purpose of the gaseous waste processing system is to remove and process fission product gases from the RCS, the CVCS, and other miscellaneous sources. The gaseous waste processing system has two functions: first, to collect fission product gases from the RCS and other miscellaneous sources; and second, to process and control the release of gaseous radioactive effluents to the site environs. The gaseous waste processing system is nonsafety-related and performs no safety function.

The gaseous waste system consists of nonsafety-related piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the gaseous waste system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Low Pressure Nitrogen System

The purpose of the low pressure nitrogen system is to provide low pressure nitrogen to the plant for blanketing, pressurizing, and purging various plant components. The low pressure nitrogen system is nonsafety-related and performs no safety function.

The low pressure nitrogen system consists of nonsafety-related piping and valves connected to safety-related components.

Portions of the low pressure nitrogen system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for structural integrity.

MAB Plant Vent Header (Radioactive) System

The purpose of the mechanical auxiliary building (MAB) radioactive vent header system is to collect and transport radioactive gases from various tanks and equipment for release into the plant main exhaust duct. The MAB radioactive vent header system is nonsafety-related and performs no safety function.

The mechanical auxiliary building radioactive vent header system consists of filters, piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the MAB radioactive vent header system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Nonradioactive Chemical Waste System

The purpose of the nonradioactive chemical waste system is to collect and neutralize nonradioactive liquid waste for delivery to the main cooling reservoir. The nonradioactive chemical waste system is nonsafety-related and performs no safety function.

The nonradioactive chemical waste system consists of sump pumps, discharge piping, valves that are located within safety-related areas and connected to safety-related components.

Portions of the nonradioactive chemical waste system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Open Loop Auxiliary Cooling System

The purpose of the open loop auxiliary cooling system is to supply cooling water to the main turbine and steam generator feedwater pump turbine lube oil coolers, the auxiliary cooling water saltwater/freshwater heat exchangers, the generator hydrogen cooler, the mechanical auxiliary building HVAC chillers, and the reactor containment fan cooler HVAC chillers. The open loop auxiliary cooling system is a nonsafety-related system and performs no safety function.

Portions of the open loop auxiliary cooling system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction.

Potable Water and Well Water System

The purpose of the potable water system is to provide treated and filtered water for human consumption, plumbing fixtures, and makeup water to the essential cooling pond. The water source is from onsite freshwater wells. The potable water system is nonsafety-related and performs no safety function.

The potable water system consists of tanks, piping and valves that are located within safety-related areas.

Portions of the potable water system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction.

Secondary Process Sampling System

The purpose of the secondary sampling system is to collect samples from various systems without requiring access to containment during normal operation. The secondary sampling system is nonsafety related and performs no safety-related function.

The secondary sampling system is used to obtain samples from the following systems:

- Steam generator blowdown
- Main steam
- Condensate
- Feedwater
- Auxiliary cooling water system
- Heater drips and drains
- Circulating water
- Condensate storage
- Condensate polishing

The secondary sampling system consists of piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the secondary sampling system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Solid Waste Processing System

The purpose of the solid waste processing system is to provide a means for the collection, processing, packaging, temporary storage, and preparation for shipment of evaporator concentrates, spent ion exchange resins, expended liquid filter cartridges, and other miscellaneous solid and liquid wastes generated during plant operations and maintenance. The solid waste processing system is a nonsafety-related system and performs no safety function.

The solid waste processing system consists of an accumulator, tanks, piping and valves that are located in safety-related areas.

Portions of the solid waste processing system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction.

Turbine Vents and Drains System

The purpose of the turbine vents and drains system is to support operation of the main turbine by providing for the venting and draining of the main turbine and other systems. The turbine vents and drains system is nonsafety-related and performs no safety-related functions.

The turbine vents and drains system consists of piping and valves that are located within safety-related areas and connected to safety-related components.

Portions of the turbine vents and drains system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

STP UFSAR References

Details of the boron recycling system are discussed in UFSAR Section 9.3.4.2.

Details of the condensate system are discussed in UFSAR Sections 10.3.5, 10.4.1, 10.4.5, 10.4.6, and 10.4.7.

Details of the condensate storage system are discussed in UFSAR Section 9.2.6.

Details of the essential cooling pond makeup system are discussed in UFSAR Section 9.2.5.3.2.

Details of the gaseous waste processing system are discussed in UFSAR Section 11.3 and Table 3.2A-1.

Details of the low pressure nitrogen system are discussed in UFSAR Section 2.2.2.7.

Details of the MAB plant vent header (radioactive) system are discussed in UFSAR Section 11.3 and Table 3.2.A-1.

Details of the nonradioactive chemical waste system are discussed in UFSAR Sections 9.2.3.2 and 9.3.3.

Details of the open loop auxiliary cooling system are discussed in UFSAR Section 9.2.1.1

Details of the potable water and well water system are discussed in UFSAR Sections 1.2.2.10, 6.4.1, and 9.2.4.

Details of the secondary process sampling system are discussed in UFSAR Section 9.3.2 and Table 9.3-3.

Details of the solid waste processing system are discussed in UFSAR Section 11.4 and Table 3.2.A-1.

Details of the turbine vents and drains system are discussed in UFSAR Section 10.2.

License Renewal Boundary Drawings

The license renewal boundary drawings for the boron recycling system are listed below:
LR-STP-BR-7R189F05010#1
LR-STP-BR-7R189F05011#1
LR-STP-BR-7R189F05010#2
LR-STP-BR-7R189F05011#2

The license renewal boundary drawings for the condensate system are listed below:
LR-STP-CD-9S219F20015#1
LR-STP-CD-6S189F00039#1
LR-STP-CT-5S199F00020#1
LR-STP-WL-5R309F05027#1
LR-STP-CD-9S219F20015#2
LR-STP-CD-6S189F00039#2
LR-STP-CT-5S199F00020#2
LR-STP-WL-5R309F05027#2

The license renewal boundary drawings for the condensate storage system are listed below:
LR-STP-CT-5S199F00020#1
LR-STP-NL-6T180F00078
LR-STP-CT-5S199F00020#2

The license renewal boundary drawings for the essential cooling pond makeup system are listed below:
LR-STP-DR-6Q069F20005#1
LR-STP-DR-6Q069F20005#2

The license renewal boundary drawings for the gaseous waste processing system are listed below:
LR-STP-WG-7R319F05043#1
LR-STP-WG-7R319F05055#1
LR-STP-WG-7R319F05043#2
LR-STP-WG-7R319F05055#2

The license renewal boundary drawings for the low pressure nitrogen system are listed below:
LR-STP-CH-5V119V10001#1
LR-STP-NL-6Q210F00069
LR-STP-NL-6S180F10003
LR-STP-NL-6S190F00009
LR-STP-NL-6T180F00078
LR-STP-NL-9R039F05045#1
LR-STP-CH-5V119V10001#2
LR-STP-NL-9R039F05045#2

The license renewal boundary drawings for the MAB plant vent header (radioactive) system are listed below:
LR-STP-HM-5V109V00009#1
LR-STP-VE-9Q069F05036#1
LR-STP-HM-5V109V00009#2
LR-STP-VE-9Q069F05036#2

The license renewal boundary drawings for the nonradioactive chemical waste system are listed below:
LR-STP-DR-6Q069F20005#1
LR-STP-DR-6Q069F20005#2

The license renewal boundary drawings for the open loop auxiliary cooling system are listed below:
LR-STP-OC-6T249F00033#1
LR-STP-OC-6T249F00033#2

The license renewal boundary drawing for the potable water and well water system is listed below:
LR-STP-PW-9M889B0148#1
LR-STP-PW-9M889B0148#2
LR-STP-PW-9Q130F00013

The license renewal boundary drawings for the secondary process sampling system are listed below:
LR-STP-CT-5S199F00020#1
LR-STP-SS-9Z329Z47521#1
LR-STP-CT-5S199F00020#2
LR-STP-SS-9Z329Z47521#2

The license renewal boundary drawings for the solid waste processing system are listed below:
LR-STP-WS-6R329F05048#1
LR-STP-WS-6R329F05059#1
LR-STP-WS-6R329F05048#2
LR-STP-WS-6R329F05059#2

The license renewal boundary drawings for the turbine vents and drains system are listed below:
LR-STP-MD-6T169F00055#1
LR-STP-MD-6T169F00072#1
LR-STP-MS-5S109F00016#1
LR-STP-MS-5S141F00024-2
LR-STP-MD-6T169F00055#2
LR-STP-MD-6T169F00072#2
LR-STP-MS-5S109F00016#2
LR-STP-MS-5S142F00024-2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.3-27 - Miscellaneous Systems In scope ONLY based on Criterion 10 CFR 54.4(a)(2).

Table 2.3.3-27 Miscellaneous Systems In scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function
Accumulator	Leakage Boundary (spatial)
Closure Bolting	Leakage Boundary (spatial) Structural Integrity (attached)
Filter	Leakage Boundary (spatial)
Heat Exchanger (Boron Recycle Evaporator)	Leakage Boundary (spatial)
Piping	Leakage Boundary (spatial) Structural Integrity (attached)

Table 2.3.3-27 Miscellaneous Systems In scope ONLY based on Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function
Pump	Leakage Boundary (spatial)
Sight Gauge	Leakage Boundary (spatial)
Strainer	Leakage Boundary (spatial)
Tank	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.3.2-27, Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems In scope ONLY based on Criterion 10 CFR 54.4(a)(2).

2.3.4 Steam and Power Conversion Systems

This section addresses scoping and screening results for the following systems:

- Main steam (Section 2.3.4.1)
- Auxiliary steam system and boilers (Section 2.3.4.2)
- Feedwater (Section 2.3.4.3)
- Demineralizer water (make-up) (Section 2.3.4.4)
- Steam generator blowdown (Section 2.3.4.5)
- Auxiliary feedwater (Section 2.3.4.6)
- Electrohydraulic control (Section 2.3.4.7)

2.3.4.1 Main Steam System

System Description

The purpose of the main steam system is to convey the generated steam produced in the steam generators to the turbine generator, turbine driven feedwater pumps, the turbine-driven auxiliary feed pumps, steam dump valves, reheaters, and the auxiliary steam system. One main steam line in each unit, upstream of an main steam isolation valves (MSIV), supplies steam to the auxiliary feedwater pump turbine.

The main steam system consists of main steam lines, associated piping and valves, atmospheric relief valves, atmospheric relief valve hydraulic operator's accumulators, tanks, including associated hydraulic piping and valves, safety valves, MSIVs. The main steam system includes nonsafety-related steam vents, drains and associated piping.

System Intended Functions

The main steam system provides heat removal from the reactor coolant system for controlled cooldown. Portions of the main steam system provide containment isolation and overpressure protection for the secondary side of the steam generators and the main steam piping. The main steam system also provides steam as a motive force to support the operation of the auxiliary feedwater pump turbine. Therefore, the main steam system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the main steam system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the main steam system are within the scope of license renewal to support anticipated transients without scram, fire protection, station blackout and environmental qualification requirements based upon the criteria 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the main steam system are included in UFSAR Section 10.3.

License Renewal Boundary Drawings

The license renewal boundary drawings for the main steam system are listed below:
LR-STP-MS-5S109F00016#1
LR-STP-MS-5S141F00024-2
LR-STP-MS-6S109F00017#1
LR-STP-MS-5S109F00016#2
LR-STP-MS-5S142F00024-2
LR-STP-MS-6S109F00017#2
LR-STP-MS-5S101Z51002
LR-STP-MS-5S102Z51002

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-1 – Main Steam System.

Table 2.3.4-1 Main Steam System

Component Type	Intended Function
Accumulator	Pressure Boundary
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Filter	Pressure Boundary
Insulation	Insulate (Mechanical)
Orifice	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached) Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Sight Gauge	Pressure Boundary

Table 2.3.4-1 Main Steam System (Continued)

Component Type	Intended Function
Solenoid Valve	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Trap	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-1, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Main Steam System.

2.3.4.2 Auxiliary Steam System and Boilers

System Description

The purpose of the auxiliary steam system is to provide steam for both units during various station operating modes. The auxiliary steam system provides startup and pegging steam for the turbine plant deaerator, startup steam for the main turbine and steam generator feed pump turbine seals when no other steam source is available, and steam required for operation of evaporators on the liquid waste processing system and the boron recycle system.

Portions of the auxiliary steam system contain temperature sensors and high pressure differential switches that are used to detect auxiliary steam line breaks in the mechanical auxiliary building, and transmit signals to the safety valves for isolation. This equipment is provided to limit the magnitude and duration of the harsh environment in areas of the mechanical auxiliary building, which contain safety-related equipment due to auxiliary steam system line breaks. The safety-related portions of the auxiliary steam system consist of a flow element, automated isolation valves and piping.

The auxiliary steam system consists of the safety-related high pressure differential switches auxiliary steam isolation valves and piping. The auxiliary steam system contains nonsafety-related piping and valves that are located within safety-related areas.

System Intended Functions

The auxiliary steam system provides HELB isolation in the event of a pipe break to limit the magnitude and duration of the harsh environment. Therefore, the auxiliary steam system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the auxiliary steam system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity attached.

Portions of the auxiliary steam system are within the scope of license renewal to support fire protection and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the auxiliary steam system and boilers are included in UFSAR Section 9.5.9.

License Renewal Boundary Drawings

The license renewal boundary drawings for the auxiliary steam system and boilers are listed below:
LR-STP-FW-6S139F20009#1
LR-STP-WL-5R309F05027#1
LR-STP-FW-6S139F20009#2
LR-STP-WL-5R309F05027#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-2 - Auxiliary Steam System and Boilers.

Table 2.3.4-2 Auxiliary Steam System and Boilers

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Pressure Boundary
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

Table 2.3.4-2 Auxiliary Steam System and Boilers (Continued)

Component Type	Intended Function
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-2, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Steam System and Boilers.

2.3.4.3 Feedwater System

System Description

The purpose of the feedwater system is to deliver high-purity feedwater, at required pressure, temperature, quality and flowrate, to the steam generators. Feedwater is supplied by three motor driven feedwater booster pumps, three turbine-driven feedwater pumps and a motor-driven start-up feedwater pump.

Containment isolation is provided using two valves on each feedwater line entering the containment. The valve closest to the penetration is a swing check valve while the upstream valve is a hydraulically operated, fail-closed stop valve. This arrangement satisfies the requirements for containment isolation for post-DBA.

The feedwater system consists of feedwater control valves, low power feed regulation valves, feedwater isolation valves, associated piping and valves.

System Intended Functions

The feedwater system provides feedwater isolation to prevent excessive cooldown of the reactor coolant system or containment over-pressurization following a steam line break. Portions of the feedwater system also support containment integrity. Therefore, the feedwater system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the feedwater system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the feedwater system are within the scope of license renewal to support fire protection, environmental qualification, and ATWS requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the feedwater system are included in UFSAR Sections 7.8 and 10.4.7.

License Renewal Boundary Drawings

The license renewal boundary drawings for the feedwater system are listed below:

LR-STP-FW-5S139F00062#1
LR-STP-FW-5S139F00063#1
LR-STP-FW-6S139F20009#1
LR-STP-FW-5S139F00062#2
LR-STP-FW-5S139F00063#2
LR-STP-FW-6S139F20009#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-3 - Feedwater System.

Table 2.3.4-3 Feedwater System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Pressure Boundary
Insulation	Insulate (Mechanical)
Orifice	Leakage Boundary (spatial) Structural Integrity (attached)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Valve Operator	Leakage Boundary (spatial) Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-3, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Feedwater System.

2.3.4.4 Demineralized Water (Make-up) System

System Description

The purpose of the demineralized water (makeup) system is to use sodium hypochlorite treated and filtered service water as influent and remove ionic impurities of raw water to provide high-purity demineralized water suitable for use in the primary and secondary cycles of the plant.

The demineralized water (makeup) system consists of a demineralizer water heater tanks, a demineralizer water heater circulation pump, containment isolation valves and associated piping and valves. The system contains nonsafety-related piping and valves that are located within safety-related areas.

System Intended Functions

The makeup demineralized water system provides containment integrity using containment isolation valves. Therefore, the makeup demineralized water system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the makeup demineralized water system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity attached.

STP UFSAR References

Additional details of the demineralizer water (make-up) system are included in UFSAR Sections 9.2.3, 9.2.6, and 9.2.7.

License Renewal Boundary Drawings

The license renewal boundary drawings for the demineralizer water (make-up) system are listed below:
LR-STP-CT-5S199F00020#1
LR-STP-DG-5Q159F22540#1
LR-STP-DW-5S199F05034#1
LR-STP-PW-9M889B0148#1
LR-STP-RM-5R279F05033#1
LR-STP-CT-5S199F00020#2
LR-STP-DG-5Q159F22540#2
LR-STP-DW-5S199F05034#2

LR-STP-PW-9M889B0148#2
LR-STP-RM-5R279F05033#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-4 – Demineralizer Water (Make-up) System.

Table 2.3.4-4 Demineralizer Water (Make-up) System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Structural Integrity (attached)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial)
Tank	Leakage Boundary (spatial)
Tubing	Leakage Boundary (spatial)
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-4, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Demineralizer Water (Make-up) System.

2.3.4.5 Steam Generator Blowdown System

System Description

The purpose of the steam generator blowdown system is to provide continuous blowdown of water from the lower portion of each steam generator to maintain the steam generator secondary side water chemistry within specification, prevent buildup of corrosion products, reduce steam generator radioactivity levels, and provide the means of draining the steam generator secondary side. The blowdown from each steam generator flows under pressure to a blowdown flash tank. The sludge lancing and chemical cleaning system is evaluated with the steam generator blowdown system.

The purpose of the sludge lancing and chemical cleaning system is to convey fluids from the containment to the fuel handling building during outages. It is normally isolated from the steam generators by blank flanged connections.

The steam generator blowdown system and the sludge lancing and chemical cleaning systems consist of piping, valves, pumps, and tanks. These systems contain piping which penetrate containment and contain the necessary containment isolation valves.

System Intended Functions

The steam generator blowdown system provides containment integrity using containment isolation valves. Therefore, the steam generator blowdown system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the steam generator blowdown system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the steam generator blowdown system are within the scope of license renewal to support anticipated transients without scram, fire protection, and environmental qualification requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the steam generator blowdown system are included in UFSAR Section 10.4.8.

License Renewal Boundary Drawings

The license renewal boundary drawings for the steam generator blowdown system are listed below:
LR-STP-AF-5S141F00024-1
LR-STP-FW-5S139F00063#1
LR-STP-PS-9Z329Z00047#1
LR-STP-SB-5S209F05057#1
LR-STP-SB-5S209F20001#1
LR-STP-SB-5S209F20002#1
LR-STP-AF-5S142F00024-1
LR-STP-FW-5S139F00063#2
LR-STP-PS-9Z329Z00047#2
LR-STP-SB-5S209F05057#2
LR-STP-SB-5S209F20001#2
LR-STP-SB-5S209F20002#2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-5 - Steam Generator Blowdown System.

Table 2.3.4-5 Steam Generator Blowdown System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Flow Element	Leakage Boundary (spatial) Structural Integrity (attached)
Insulation	Insulate (Mechanical)
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Leakage Boundary (spatial) Structural Integrity (attached)
Strainer	Leakage Boundary (spatial) Structural Integrity (attached)
Tank	Structural Integrity (attached)
Tubing	Leakage Boundary (spatial) Pressure Boundary
Valve	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-5, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Steam Generator Blowdown System.

2.3.4.6 Auxiliary Feedwater System

System Description

The purpose of the auxiliary feedwater (AFW) system is to supply feedwater to the steam generators during startup, shutdown, and emergency conditions. The AFW system takes feedwater from the auxiliary feedwater storage tank (AFST) through the auxiliary feedwater pumps and discharges to the steam generators.

The AFW system consists of motor-driven auxiliary feedwater pumps, a turbine-driven auxiliary feedwater pump, an auxiliary feedwater storage tank and associated piping and valves. The turbine-driven auxiliary feedwater pump lube oil system consists of an oil cooler heat exchanger, tubing, piping and valves.

System Intended Functions

The AFW system maintains steam generator inventory and provides decay heat removal. The AFW system provides containment integrity using containment isolation valves.

Therefore, the auxiliary feedwater system is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Portions of the auxiliary feedwater system are within the scope of license renewal as nonsafety-related affecting safety-related components based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction and structural integrity.

Portions of the auxiliary feedwater system are within the scope of license renewal to support fire protection, environmental qualification, ATWS, and station blackout requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the auxiliary feedwater system are included in UFSAR Section 10.4.9.

License Renewal Boundary Drawings

The license renewal boundary drawings for the auxiliary feedwater system are listed below:
LR-STP-AF-5S141F00024-1
LR-STP-AF-5S141F22547
LR-STP-CT-5S199F00020#1
LR-STP-FW-5S139F00063#1
LR-STP-MS-5S141F00024-2
LR-STP-AF-5S142F00024-1
LR-STP-AF-5S142F22547
LR-STP-CT-5S199F00020#2
LR-STP-FW-5S139F00063#2
LR-STP-MS-5S142F00024-2

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-6 - Auxiliary Feedwater System.

Table 2.3.4-6 Auxiliary Feedwater System

Component Type	Intended Function
Closure Bolting	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Filter	Pressure Boundary
Flow Element	Pressure Boundary
Hatch	Pressure Boundary

Table 2.3.4-6 Auxiliary Feedwater System (Continued)

Component Type	Intended Function
Heat Exchanger (AF Turbine Oil Cooler)	Heat Transfer Pressure Boundary
Orifice	Pressure Boundary Throttle
Piping	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Pump	Pressure Boundary
Tank	Pressure Boundary
Thermowell	Pressure Boundary
Tubing	Leakage Boundary (spatial) Pressure Boundary Structural Integrity (attached)
Turbine	Pressure Boundary
Valve	Pressure Boundary Structural Integrity (attached)

The AMR results for these component types are provided in Table 3.4.2-6, Steam and Power Conversion Systems – Summary of Aging Management Evaluation – Auxiliary Feedwater System.

2.3.4.7 Electrohydraulic Control System

System Description

The purpose of the electrohydraulic control system is to provide the motive force for positioning the turbine-generator steam valves that regulate the flow of steam through the main turbine. The electro-hydraulic control system is nonsafety-related except for a set of safety-related electrical pressure switches for turbine trip signals, which are evaluated with the plant electrical equipment.

The electrohydraulic control system provides no safety function except for the fail-safe trip signals generated by fluid pressure switches. The trip signals serve as inputs for the reactor protection system and ATWS circuits. All in-scope components for this system are electrical and I&C.

System Intended Functions

Portions of the electro-hydraulic control system are within the scope of license renewal to support environmental qualification and ATWS requirements based upon the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the electrohydraulic control system can be found in UFSAR Sections 7.2 and 10.2.2.7.

License Renewal Boundary Drawings

There are no license renewal boundary drawings for the electrohydraulic control system.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.3.4-7 – Electrohydraulic Control System.

Table 2.3.4-7 Electrohydraulic Control System

Component Type	Intended Function
None	N/A

2.4 SCOPING AND SCREENING RESULTS: STRUCTURES

The containments, structures, and component supports scoping and screening results consist of lists of component types that require aging management review, arranged by structure. Brief descriptions and intended functions are provided for structures within the scope of license renewal. For each in-scope structure, component types requiring an aging management review are provided.

In addition to the structures within the scope of license renewal presented in this section, the component supports are evaluated as a commodity.

A license renewal site drawing (LR-STP-STRUC-9Y100M00001) was created for structures based on the site plan.

This section provides the following information for each structure within the scope of license renewal:

- A description of the structure,
- Structure purpose and intended function(s)
- Reference to the applicable UFSAR section(s), and
- A listing of the component types requiring aging management review and associated component intended functions.

For component supports, this section provides the following information:

- A general description of commodity,
- Purpose and intended function of the commodity,
- Reference to the applicable UFSAR section(s), and
- A listing of the component types requiring aging management review and associated component intended functions.

The containments, structures, and component supports scoping and screening results are provided for the following structures and commodity group:

- Containment building (Section 2.4.1)
- Control room (Section 2.4.2)
- Diesel generator building (Section 2.4.3)
- Turbine generator building (Section 2.4.4)
- Mechanical-electrical auxiliary building (MEAB) (Section 2.4.5)
- Miscellaneous yard areas and buildings (In Scope) (Section 2.4.6)
- Electrical foundations and structures (Section 2.4.7)
- Fuel handling building (Section 2.4.8)
- Essential cooling water structures (Section 2.4.9)
- Auxiliary feedwater storage tank foundation and shell (Section 2.4.10)
- Supports (Section 2.4.11)

2.4.1 Containment Building

Structure Description

The containment building is a seismic Category I structure. The shell of the building is a prestressed, reinforced concrete, cylindrical structure with a hemispherical dome roof. A continuous welded steel liner plate is anchored to the entire inside face of the containment shell. The cylinder and dome are post-tensioned with high-strength unbonded wire tendons. A continuous tendon gallery is provided below the foundation mat, at its periphery, for installation and inspection of the vertical post-tensioning system. The containment wall is independent of the adjacent interior and exterior structures, with a specified minimum gap maintained between the containment wall and the adjacent structures to prevent contact under all loading conditions. Expansion bellows permit thermal expansion of the fuel transfer tube and differential movement between structures.

The containment building foundation is a conventionally reinforced concrete mat, circular in plan and of uniform thickness. It is founded on structural backfill, which was compacted above a dense granular layer in an excavation that cut the impermeable layer between the lower and upper shallow aquifers in the plant area. During construction, the shallow aquifer was dewatered to permit a mass excavation. Upon completion of the plant area substructure construction and backfill, the groundwater in the shallow aquifer zone was allowed to return to the natural elevations. There are no requirements for any artificial groundwater control by either dewatering or recharge during plant operation. Waterproofing membranes were applied to exterior surfaces below finished-grade level.

The major structural components of the containment building are discussed in the following sections:

- Post-tensioning system
- Steel liner plate
- Containment building access
- Other penetrations
- Internal structures
- Containment sump and trisodium phosphate (TSP) basket

Post-Tensioning System

The cylindrical portion and the hemispherical dome of the containment are prestressed by a post-tensioning system consisting of horizontal and vertical tendons. The cylinder and the lower half of the dome are prestressed by horizontal tendons anchored 360 degrees apart, bypassing the intermediate buttresses. Each successive hoop tendon is progressively offset 120 degrees from the one beneath it. The vertical U-shaped tendons are continuous over the dome, forming a two-way system for the dome. These tendons are anchored in the continuous gallery beneath the base mat. The tendons are placed in embedded-tendon sheaths which are filled with a corrosion inhibitor.

Steel Liner Plate

A continuous welded carbon steel liner plate is provided on the entire inside face of the containment to limit the release of radioactive materials into the environment. The liner plate on top of the foundation mat is covered with a 24 in. concrete fill slab. An increased plate thickness is provided around all penetrations and for the crane girder brackets. An anchorage system is provided to prevent instability of the liner.

Containment Building Access

Access into the containment building is provided by an equipment hatch, a personnel airlock, and an auxiliary airlock. The equipment hatch is a single-closure penetration. It consists of a welded steel barrel furnished with a double O-ring gasket and a bolted, dished door. The barrel is anchored into the concrete containment wall. The personnel airlock and the auxiliary airlock are welded-steel assemblies with gasketed double doors.

Other Penetrations

Other penetrations through the containment pressure boundary include the electrical penetrations, the piping penetrations, and the fuel transfer tube. All penetrations are pressure-resistant, leaktight, welded assemblies. The penetration sleeves are welded to the liner and anchored into the concrete containment wall.

<u>Electrical Penetrations</u> - Canister-type penetrations are used for electrical conductors passing through the containment. The penetration canisters are installed in steel penetration sleeves welded into the wall of the containment liner. Sealing between the canisters and the sleeves is accomplished by welding.

<u>Piping Penetrations</u> - Piping penetration assemblies are generally of three types, the type of penetration used for a particular line being dependent on the service requirements of that line. A high-energy penetration is used where the temperature or pressure of the fluid is high and considerable thermal movement of the line can be expected. Moderate-energy penetrations are used where little or no thermal movement of the process line is anticipated. Multiple penetrations are used where more than one pipe goes through a penetration.

<u>Fuel Transfer Tube</u> - The fuel transfer tube penetration between the refueling canal in the containment building and the spent fuel pool in the fuel handling building consists of a stainless steel pipe inside a carbon steel penetration sleeve. The inner pipe acts as a transfer tube; the penetration sleeve is welded to the containment liner. Bellows expansion joints are provided to permit differential movement.

Internal Structures

The containment internal structures are designed to provide structural supporting elements for the major components of the NSSS as well as to provide required shielding, both against internal missiles and for biological protection. Basic structural components are designed using both reinforced concrete and structural steel as appropriate. The internal structures consist of the following major elements.

<u>Primary Shield Wall</u>: The primary shield is a heavily reinforced, concrete wall that houses and supports the reactor pressure vessel (RPV). The primary shield wall is anchored into the containment base slab and extends up to the refueling pool. It is built integrally with the refueling cavity walls. The primary shield wall provides missile protection and biological shielding and also serves as a support for pipe-whip restraints.

<u>Secondary Shield Walls</u>: The secondary shield walls form the exterior of the primary loop compartment. The primary shield and refueling pool walls form the interior boundary. The bottom of the compartment is formed by the interior fill slab, while the top is open to the containment atmosphere. The secondary shield walls provide radiation shielding, isolate the RCS, laterally restrain the steam generators, reactor coolant pumps, and pressurizer, support the nuclear steam supply system and auxiliary feedwater system, serve as pipe-whip restraint supports, and safeguard the electrical and mechanical systems.

<u>Refueling Cavity</u>: The refueling cavity is a reinforced concrete structure consisting of the reactor cavity surrounding the upper portion of the RPV and the refueling canal, which connects the fuel storage area and the fuel transfer penetration to the reactor cavity. The reactor cavity and the refueling canal are separated by a stainless steel, manually operated, double-bulkhead gate. The refueling cavity walls are lined with stainless steel plate. The refueling cavity is used during refueling operations to provide shielded access for transferring the new and spent fuel elements between the RPV and the fuel transfer penetration. The refueling cavity also serves as a shielded laydown area for the RPV upper and lower internals.

<u>Operating Floor</u>: The operating floor covers the space between the secondary shield walls and the containment wall. The floor slab is supported by the secondary shield walls and by beams and columns. The function of the operating floor is to provide a working and access floor during refueling, maintenance, and repair operations.

<u>Intermediate Floors</u>: Four intermediate floors between the secondary shield walls and the containment wall are provided. These floors are supported by structural steel framing spanning between the secondary shield walls and columns and extending up from the base slab. Various access, maintenance and in-service inspection platforms are also provided around equipment.

<u>Interior Fill Slab</u>: The interior fill slab is placed on top of the foundation mat liner plate. This slab provides protection for the foundation mat liner from any missiles generated in the primary loop compartments and from the effects of temperatures induced by a DBA. Reinforcement is provided to resist temperature and shrinkage forces.

<u>Polar Crane</u>: A polar crane supported on twin bridge girders is provided inside the containment building for use during construction, maintenance, and repair operations. The

crane moves on a circular rail, which in turn is supported on girders. Brackets anchored on the cylindrical wall through the liner support these girders. The polar crane is anchored to the rails with mechanical guides to prevent its derailment when subjected to earthquake forces.

Structural and miscellaneous steel: Structural and miscellaneous steel is installed inside the containment building to provide support for various safety-related and non safety-related systems and components, including platforms, stairways, and ladders, which facilitate access to the various elevations and areas for inspection and maintenance.

Removable Concrete Block Walls: These removable concrete block walls are located at various locations within the reactor containment building serving as fire barriers.

Supports for the reactor vessel, steam generators, reactor coolant pumps, pressurizer, and reactor coolant system pipe are attached to the steel framing and to the concrete structures of the containment building. These supports are addressed in Section 2.4.11. Also supported by the internal containment structures are supports for piping, ducts, miscellaneous equipment, electrical cable trays and conduit, instruments and tubing, and electrical and instrumentation enclosures and racks which are also addressed in Section 2.4.11.

Containment Sump and Trisodium Phosphate (TSP) Basket

Following a large break LOCA, the containment spray water and spilled RCS water will be routed to the containment sump. TSP stored in stainless steel baskets on the containment floor will be dissolved and the alkaline fluid will be recirculated to reduce the concentration and quantity of fission products in the containment atmosphere.

Structure Intended Function

The purpose of the containment building is to limit the release of radioactive fission products and the resulting dose to the public and the control room operators. The containment building also provides physical support for itself, the reactor coolant system, engineered safety features, and other systems and equipment within the structure. The exterior walls and dome provide shelter and protection for the reactor vessel and other safety-related SSCs. Therefore, the containment building is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The containment building shelters and protects nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the containment building is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The containment building is required to support fire protection, station blackout, and ATWS requirements based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the containment building are included in UFSAR Sections 2.5.4.5, 3.8.1, and 3.8.3.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-1 - Containment Building.

Table 2.4-1 Containment Building

Component Type	Intended Function
Bellows	Expansion/Separation Structural Pressure Boundary Structural Support
Caulking and Sealant	Shelter, Protection
Compressible Joints and Seals	Shelter, Protection Structural Pressure Boundary
Concrete Block (Masonry Walls)	Fire Barrier Structural Support
Concrete Elements	Fire Barrier Flood Barrier HELB Shielding Missile Barrier Shelter, Protection Shielding Structural Pressure Boundary Structural Support
Fire Barrier Coatings and Wraps	Fire Barrier
Fire Barrier Doors	Fire Barrier
Gate	Structural Pressure Boundary
Hatch - Auxiliary Airlock	Shielding Structural Pressure Boundary Structural Support
Hatch - Equipment	Structural Pressure Boundary Structural Support
Hatch - Personnel Airlock	Fire Barrier, Shielding Structural Pressure Boundary Structural Support
Hatches and Plugs	Missile Barrier
Liner Containment	Shelter, Protection Structural Pressure Boundary

Table 2.4-1 Containment Building (Continued)

Component Type	Intended Function
Liner Refueling	Shelter, Protection Structural Pressure Boundary
Penetration	Shielding Structural Pressure Boundary Structural Support
Penetrations Electrical	Shielding Structural Pressure Boundary Structural Support
Pipe Whip Restraints and Jet Shields	HELB Shielding Missile Barrier Structural Support
Stairs, Platforms & Grates	Structural Support
Structural Steel	Structural Support
Sump	Shelter, Protection
Tendons	Structural Support
TSP Baskets	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-1, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Containment Building.

2.4.2 Control Room

Structure Description

The control room is located in the mechanical and electrical auxiliaries building (MEAB), which is a multistory, structural steel and reinforced concrete seismic Category I structure supported by a reinforced concrete basemat.

For the purpose of license renewal scoping and screening, the control room includes the control room pressure boundary and all components inside this boundary. This envelope encompasses the control room on the 35 ft elevation of the MEAB between columns 20 and 24 and A and H, and HVAC rooms at the 10 ft and 60 ft elevations. The control room envelope provides a protected environment for essential plant personnel and SSCs.

Structure Intended Function

The control room is part of a safety-related, seismic Category I structure that provides support, shelter, and protection to engineered safety features and nuclear auxiliary systems. Therefore, the control room is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The control room shelters and protects nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the control room is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The control room is a safety-related structure that provides structural support, shelter, and protection for components required to demonstrate compliance with fire protection, ATWS, and station blackout requirements. Therefore, the control room is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the control room are included in UFSAR Sections 3.8.4.1.1 and 6.4.1.1.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-2 - Control Room.

Table 2.4-2 Control Room

Component Type	Intended Function
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Pressure Boundary Structural Support
Fire Barrier Coatings and Wraps	Fire Barrier
Fire Barrier Doors	Fire Barrier Shelter, Protection Structural Pressure Boundary
Fire Barrier Seals	Fire Barrier
Gypsum and Plaster Barrier	Structural Support

Table 2.4-2 Control Room (Continued)

Component Type	Intended Function
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Stairs, Platforms and Grates	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-2, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Control Room.

2.4.3 Diesel Generator Building

Structure Description

The diesel generator building is a seismic Category 1, multi-story, reinforced concrete structure that houses the emergency diesel generators, diesel oil tanks, and the intake and exhaust equipment. The building is supported by a reinforced concrete base mat founded on engineered structural backfill. The diesel generators are supported on the same reinforced concrete mat foundation. The roof is a reinforced concrete slab supported by reinforced concrete bearing walls. A reinforced concrete barrier wall separates the three emergency diesel generators and diesel auxiliaries.

Structure Intended Function

The diesel generator building provides structural support and shelter/protection of components relied upon to provide the capability to shutdown the reactor and maintain it in a safe shutdown condition. Therefore, the diesel generator building is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The diesel generator building shelters and protects nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the diesel generator building is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

Portions of the diesel generator building are required to provide support, shelter, and protection for components required to cope with and recovery from a station blackout and fire protection requirements. Therefore, the diesel generator building is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the diesel generator building are included in UFSAR Sections 3.8.4.1.2, 3.8.5.1, and 9.5.1.2.7.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-3 - Diesel Generator Building.

Table 2.4-3 Diesel Generator Building

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection
Compressible Joints and Seals	Expansion/Separation Shelter, Protection
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Support
Doors	Flood Barrier Missile Barrier Shelter, Protection
Fire Barrier Doors	Fire Barrier Shelter, Protection
Fire Barrier Seals	Fire Barrier
Hatch	Missile Barrier Shelter, Protection
Hatches and Plugs	Fire Barrier Missile Barrier Shelter, Protection
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Stairs, Platforms and Grates	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-3, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Diesel Generator Building.

2.4.4 Turbine Generator Building

Structure Description

The non-Category I turbine generator building (TGB) is a semi-open, three level steel structure supported on individual or combined mat or pedestal-and-mat reinforced concrete foundations. The de-aerator structure, which is an open steel frame structure supported by concrete pedestals on individual or combined concrete pile caps, is located on the east side of the TGB. The TGB houses the turbine-generator, steam generator feed pumps, feedwater heaters, electrical switchgear, air compressors, and other miscellaneous equipment. The de-aerator structure supports two de-aerator storage tanks and one de-aerator heater. The TGB and de-aerator structure are in close proximity to the Category I isolation valves cubicle, mechanical/electrical auxiliary building, and diesel generator building. Non-Category I structures located near Category I SSCs have been designed either to withstand tornado loads or not to collapse against Category I structures under tornado loadings. An exterior grated walkway is installed above portions of safety-related conduit and therefore is within the scope of license renewal for spatial interaction.

Structure Intended Functions

The turbine generator building is a non-seismic Category I structure, whose behavior was analyzed under the extreme environmental (tornado/SSE) loads to verify that a collapse would not occur. This ensures that external safety-related SSCs would not be damaged by the turbine building during a design basis event. Therefore, the turbine generator building is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The turbine generator building provides structural support, shelter, and protection for components required to demonstrate compliance with fire protection, ATWS, and station blackout requirements. Therefore, the turbine generator building is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional design requirements applicable to the turbine generator building are included in UFSAR Section 3.3.2.3.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-4 - Turbine Generator Building.

Table 2.4-4 Turbine Generator Building

Component Type	Intended Function
Concrete Elements	Flood Barrier Shelter, Protection Structural Support
Fire Barrier Doors	Fire Barrier Shelter, Protection
Fire Barrier Seals	Fire Barrier
Metal Siding	Shelter, Protection
Stairs, Platforms and Grates	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-4, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Turbine Generator Building.

2.4.5 Mechanical-Electrical Auxiliary Building

Structure Description

The mechanical-electrical auxiliaries building (MEAB) is a seismic Category I, multistoried structure which houses mechanical equipment, electrical equipment, and the isolation valve cubicle. These three areas are separated by reinforced concrete walls and supported on a common foundation mat.

The mechanical section of the building (called the mechanical auxiliary building [MAB]) measures 245 ft long by 199 ft wide for Unit 1 and 244 ft long by 199 ft wide for Unit 2. The highest portion of the roof is at El. 95 ft and the mat is 18 ft below grade (plant grade is El. 28 ft). This section houses and supports the ESF systems, waste processing systems, piping systems, and the auxiliary equipment.

The electrical section of the building (called the electrical auxiliary building [EAB]) measures 254 ft long by 123 ft wide for Unit 1 and 253 ft long by 123 ft wide for Unit 2, with the highest portion of the roof at El. 96 ft and mat 18 ft below grade. This section houses and supports the Class 1E electrical controls, switchgear, battery room, computer room, and cable raceways. The floors and the roof are supported by structural steel beams, girders, columns, and reinforced-concrete walls.

The isolation valve cubicles section of the building measures 82 ft long by 62 ft wide. The highest portions of the split-level roof are at El. 95 ft, and the top of basemat is 18 ft below grade. Walls extend continuously to El. 86 ft and El. 95 ft-5 in. to provide fire and environmental separation for the four cubicles. A sheet metal roof, which is provided to protect the cubicle from inclement weather, is designed to blow off during a tornado or postulated high energy line break.

The physical arrangements of all three sections for both units are identical except for the following two items:

- The distance between column lines H and J is 20 ft-0 in. for Unit 1 and 19 ft-0 in. for Unit 2.
- The thickness of the concrete wall along column line M8 between column lines 28 and 32 is 3 ft-0 in. for Unit 1 and 2 ft-6 in. for Unit 2.

The control room, which is located in the EAB, is evaluated separately in Section 2.4.2.

Structure Intended Function

The MEAB is a safety-related, seismic Category I structure that provides structural support, shelter, and protection to engineered safety features and nuclear auxiliary systems. Therefore, the MEAB is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The MEAB shelters and protects nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the MEAB is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The MEAB is a safety-related structure that provides structural support, shelter, and protection for components to demonstrate compliance with fire protection requirements, and is relied upon to demonstrate compliance with ATWS and station blackout requirements. Therefore, the MEAB is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the mechanical-electrical auxiliary building are included in UFSAR Section 3.8.4.1.1.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-5 - Mechanical-Electrical Auxiliary Building.

Table 2.4-5 Mechanical-Electrical Auxiliary Building

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection
Compressible Joints and Seals	Expansion/Separation Shelter, Protection
Concrete Block (Masonry Walls)	Fire Barrier Flood Barrier Shelter, Protection Structural Support
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Support
Doors	Flood Barrier Shelter, Protection
Fire Barrier Coatings and Wraps	Fire Barrier
Fire Barrier Doors	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection
Fire Barrier Seals	Fire Barrier
Gypsum and Plaster Barrier	Fire Barrier Shelter, Protection
Hatch	Fire Barrier Missile Barrier Shelter, Protection
Hatches and Plugs	Missile Barrier Shelter, Protection
Metal Siding	Pressure Relief Shelter, Protection
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Roofing Membrane	Shelter, Protection
Stairs, Platforms and Grates	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-5, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Mechanical-Electrical Auxiliary Building.

2.4.6 Miscellaneous Yard Areas and Buildings (In Scope)

Structure Description

The miscellaneous yard areas and buildings (in scope) include the following structures:

- fire pump house
- fire water storage tanks foundations
- fire water valve structures

The fire pump house is a metal building with a sheet metal roof on a concrete foundation housing three fire pumps, each separated by reinforced concrete walls. The structure is common to both Units 1 and 2.

The fire water storage tanks foundations are reinforced concrete ring foundations. The fire water storage tanks are evaluated separately with their respective system. These two foundations are common to both Units 1 and 2.

The fire water valve structures are metal buildings with sheet metal roofing on a concrete foundation. There are three valve structures per unit.

Structure Intended Function

The miscellaneous yard areas and buildings (in scope) shelter and protect nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the miscellaneous yard areas and buildings (in scope) are within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The fire pump house provides fire barriers and structural support for fire suppression components. The fire water storage tank foundations and fire water valve structures provide structural support and shelter/protection for fire protection components. Therefore, these structures are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the miscellaneous yard areas and buildings (In Scope) are included in UFSAR Section 9.5.1.2.1 and Table 3.2.A-1.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-6 - Miscellaneous Yard Areas and Buildings (In Scope)

Table 2.4-6 Miscellaneous Yard Areas and Buildings (In Scope)

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection
Compressible Joints and Seals	Shelter, Protection
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Support
Doors	Shelter, Protection
Fire Barrier Doors	Fire Barrier Shelter, Protection
Fire Barrier Seals	Fire Barrier
Gypsum and Plaster Barrier	Shelter, Protection
Metal Siding	Shelter, Protection
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Structural Metals	Shelter, Protection Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-6, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Miscellaneous Yard Areas and Buildings (In Scope).

2.4.7 Electrical Foundations and Structures

Structure Description

The foundations for the main, auxiliary, and standby transformers are reinforced concrete pads founded on undisturbed soil and/or engineered structural backfill. All oil-filled transformers are provided with pits to catch any transformer oil which may be released due to a leak or rupture.

Outdoor switchgear, in the 345 kV switchyard, and all equipment from the main and standby transformers up to the first circuit breakers in the 345 kV switchyard, are supported on reinforced concrete pads founded on undisturbed soil and/or engineered structural backfill.

All of the transmission towers up to the first circuit breakers in the 345 kV switchyard are steel towers. The transmission towers are founded on reinforced concrete bases supported on undisturbed soil and/or engineered structural backfill.

The Class 1E underground electrical raceway system provides electrical distribution from the MEAB to the essential cooling water intake structure. The raceway system consists of banks of PVC conduits in a spaced arrangement encased in reinforced concrete. Manholes are provided along these duct banks for cable installation and access.

The main and auxiliary transformers are separated by concrete fire barrier walls.

Structure Intended Function

The Class 1E underground electrical raceway system provides structural support and shelter/protection of components relied upon to provide the capability to shutdown the reactor and maintain it in a safe shutdown condition. Therefore, it is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The concrete pads for the main transformers, auxiliary transformers, standby transformers, the concrete pads for the outdoor switchgear, and concrete bases for the transmission towers, provide structural support for SSCs required for station blackout recovery. The concrete fire barrier walls separating the main and auxiliary transformers provide spatial separation and fire barriers to meet the requirements for fire protection. The concrete duct banks and manholes provide structural support, shelter and protection for SSCs required for fire protection. Therefore, they are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the electrical foundations and structures are included in UFSAR Sections 3.8.4.1.6, 3.8.5.1.7, and 9.5.1.2.13.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-7 - Electrical Foundations and Structures.

Table 2.4-7 Electrical Foundations and Structures

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection
Compressible Joints and Seals	Expansion/Separation
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Pressure Boundary Structural Support
Duct Banks and Manholes	Shelter, Protection Structural Support
Structural Steel	Structural Support
Transmission Tower	Structural Support

The AMR results for these component types are provided in Table 3.5.2-7, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Electrical Foundations and Structures.

2.4.8 Fuel Handling Building

Structure Description

The fuel handling building (FHB) is a multistory, structural steel and reinforced concrete seismic Category I structure, supported by a reinforced concrete basemat founded on structural backfill in some areas and in-situ soil in the remaining areas. The elevated floors and roof are reinforced concrete and supported by reinforced concrete bearing walls with the roof slab being supported by structural steel trusses.

The FHB houses new fuel, spent fuel, fuel shipping container and cask, spent fuel pool heat exchanger, spent fuel pool pumps, skimmer pumps, low-head and high-head safety injection pumps, containment spray pumps, and valve isolation tank. The spent fuel is transferred from reactor containment building to spent fuel pool via transfer tube and transfer canal. The spent fuel pool and fuel transfer canals are lined with stainless steel plate with a leak detection system behind the liner.

Structure Intended Function

The fuel handling building provides structural support, shelter, and protection of components required to mitigate the consequences of accidents that could result in potential offsite exposure. Therefore, the fuel handling building is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The fuel handling building shelters and protects nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the fuel handling building is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

Portions of the fuel handling building support fire protection requirements and are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the fuel handling building are included in UFSAR Sections 3.8.4.1.3, 9.1, and Appendix 2.5.A.2.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-8 – Fuel Handling Building.

Table 2.4-8 – Fuel Handling Building

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection Structural Pressure Boundary
Compressible Joints and Seals	Expansion/Separation
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Support
Doors	Flood Barrier Shelter, Protection
Fire Barrier Coatings and Wraps	Fire Barrier
Fire Barrier Seals	Fire Barrier
Gate	Structural Pressure Boundary
Hatch	Missile Barrier Shelter, Protection
Hatches and Plugs	Missile Barrier Shelter, Protection
Liner Spent Fuel Pool	Structural Pressure Boundary

Table 2.4-8 – Fuel Handling Building (Continued)

Component Type	Intended Function
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Stairs, Platforms and Grates	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-8, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Fuel Handling Building.

2.4.9 Essential Cooling Water Structures

Structure Description

The essential cooling water (ECW) structures include the essential cooling water pond (ECP), essential cooling water intake structure (ECWIS), and essential cooling water discharge structure. All of the cooling water structures are common to Units 1 and 2. The intake and discharge structures are safety-related, seismic Category I, reinforced concrete structures, founded on engineered structural backfill. The ECP is a seismic Category I, man-made excavated pond with an embankment completely surrounding its perimeter. The ECWIS is divided into six compartments, three for each unit. The ECWIS houses the ECW pumps. The ECP provides the required cooling water for ultimate heat sink and provides the normal heat sink for plant auxiliaries.

Structure Intended Function

The seismic Category I ECW structures provide structural support, shelter, and protection for SSCs required to achieve safe shutdown of the reactor and to maintain it in a safe shutdown condition. The seismic Category I ECW structures provide structural support and shelter and protection for SSCs required to mitigate the consequences of accidents that could result in potential offsite exposure. Therefore, the ECW structures are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The essential cooling water structures provide structural support, shelter, and protection for nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, the ECW structures are within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The ECW structures provide structural support, shelter, and protection for components to demonstrate compliance with fire protection requirements and are relied upon to demonstrate compliance with station blackout requirements. Therefore, the ECW structures are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the essential cooling water structures are included in UFSAR Sections 1.2.2.4.2, 3.8.4.1.4, 3.8.4.1.5, and 9.2.5.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-9 - Essential Cooling Water Structures.

Table 2.4-9 Essential Cooling Water Structures

Component Type	Intended Function
Barrier	Heat Sink Shelter, Protection Shutdown Cooling Water
Caulking and Sealant	Flood Barrier Shelter, Protection
Concrete Elements	Fire Barrier Flood Barrier Missile Barrier Shelter, Protection Structural Support
Doors	Flood Barrier Missile Barrier Shelter, Protection
Fire Barrier Doors	Fire Barrier Shelter, Protection
Fire Barrier Seals	Fire Barrier
Hatches and Plugs	Flood Barrier Missile Barrier Shelter, Protection Structural Support
Penetrations Electrical	Structural Support
Penetrations Mechanical	Structural Support
Structural Steel	Shelter, Protection Structural Support

The AMR results for these component types are provided in Table 3.5.2-9, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Essential Cooling Water Structures.

2.4.10 Auxiliary Feedwater Storage Tank Foundation and Shell

Structure Description

The auxiliary feedwater storage tank foundation and shell are a reinforced-concrete, seismic Category I structure with cylindrical walls covered by a circular slab. The tank shell is supported by a circular concrete mat foundation which bears on structural backfill. A reinforced concrete valve room is also attached to the foundation mat. The inside of the tank has a stainless steel liner that has been evaluated with the auxiliary feedwater system in Section 2.3.4.6.

Structure Intended Function

The auxiliary feedwater storage tank (AFST) foundation and shell provide structural support for the stainless steel tank liner. The concrete shell also provides missile protection for the tank liner. The AFST is safety-related and provides the required water storage of condensate-quality water for the auxiliary feedwater system during various plant transients. Therefore, the AFST foundation, shell, and roof are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

The tank foundation and shell shelter and protect nonsafety-related SSCs whose failure could prevent performance of a safety-related function. Therefore, they are within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2).

The AFST foundation and shell provide structural support and protection for SSCs required for fire protection and is relied upon to demonstrate compliance with station blackout requirements. Therefore, they are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of the auxiliary feedwater storage tank foundation and shell are included in UFSAR Sections 2.5.4.10.1, 3.8.4.1.7, and 3.8.4.4.7.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-10 - Auxiliary Feedwater Storage Tank Foundation and Shell.

Table 2.4-10 Auxiliary Feedwater Storage Tank Foundation and Shell

Component Type	Intended Function
Caulking and Sealant	Flood Barrier Shelter, Protection
Concrete Elements	Flood Barrier Missile Barrier Shelter, Protection Structural Support
Hatch	Missile Barrier Shelter, Protection
Structural Steel	Structural Support

The AMR results for these component types are provided in Table 3.5.2-10, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Auxiliary Feedwater Storage Tank Foundation and Shell.

2.4.11 Supports

Structure Description

Mechanical and Electrical Supports

Structural supports for mechanical and electrical components are an integral part of all systems. Many of these supports are not uniquely identified with component identification numbers. However, characteristics of the supports, such as design, materials of construction, environments, and anticipated stressors, are similar. Therefore, structural supports for mechanical and electrical components are evaluated as commodities across system boundaries.

The commodity evaluation applies to structural supports within structures identified as within the scope of license renewal. The following structural supports for mechanical components are addressed:

- Supports for ASME Class 1 piping and components
- Supports for ASME Class 2 and 3 piping and components
- Supports for HVAC ducts, tube track, instrument tubing, instruments, and non-ASME piping and components

The following electrical components and supports are addressed:

- Cable trays and supports
- Conduit and supports
- Electrical panels and enclosures
- Instrument panels and racks

Structural support evaluation boundaries are based upon the following:

- Integral attachments (such as plate welded to pipe at anchor points, saddles welded to heat exchangers, etc.) are evaluated with the specific component (pipe, pump, heat exchanger, etc.).
- All pins, bolting, and other removable hardware that are part of the connection to component integral attachments are evaluated with the structural support, except high strength bolts for Class 1 NSSS supports, which are evaluated separately.
- The exposed portions of embedded components (i.e., end portion of the threaded anchor and nut) are evaluated with the component supports, except high strength bolts for Class 1 NSSS supports, as noted above.
- Concrete and supporting structural hardware (including the embedded portion of threaded anchors) are evaluated with the structure. The concrete around anchorages must be evaluated with the supports to identify any concrete degradation that would impair the function of the anchors. This package includes a separate component for the anchorage concrete for in-scope mechanical and electrical components in each building.

The following reactor coolant system component supports are included with the ASME Class 1 piping and component commodity group:

Reactor Vessel Supports

The reactor vessel is supported by four individual air-cooled rectangular box structures beneath the vessel nozzles bolted to the primary shield wall concrete. Each box structure consists of a horizontal top plate that receives loads from the reactor vessel shoe, a horizontal bottom plate supported by and transferring loads to the primary shield wall concrete, and connecting vertical plates. The supports are air-cooled to maintain the supporting concrete temperature within acceptable levels.

Steam Generator Supports

The steam generator supports consist of the following elements:

Vertical Support

Four individual columns provide vertical support for each steam generator. These are bolted at the top to the steam generator and at the bottom to the concrete structure. Spherical ball bushings at the top and bottom of each column allow unrestrained lateral movement of the steam generator during heatup and cooldown. The column base design permits both horizontal and vertical adjustment of the steam generator for erection and adjustment of the system.

Lower Lateral Support

Lateral support is provided at the generator tubesheet by fabricated steel girders and struts. These are bolted to the compartment walls and include bumpers that bear against the steam generator but permit unrestrained movement of the steam generator during changes in system temperature. Stresses in the beam caused by wall displacements during compartment pressurization and the building seismic evaluation are considered in the design.

Upper Lateral Support

The upper lateral support of the steam generator is provided by a built-up ring plate girder at the operating deck. Two-way acting snubbers restrain sudden seismic or blowdown induced motion, but permit the normal thermal movement of the steam generator. Movement perpendicular to the thermal growth direction of the steam generator is prevented by struts.

Reactor Coolant Pump Supports

Three individual columns provide the vertical support for each coolant pump. These are bolted at the top to the RCP and at the bottom to the concrete structure. Spherical ball bushings at the top and bottom of each column allow unrestrained lateral movement of the RCP during heatup and cooldown. The column base design permits both horizontal and vertical adjustment of the RCP for erection and adjustment of the system. Lateral support for seismic and blowdown loading is provided by tension tie bars and compression struts.

Pressurizer Supports

The supports for the pressurizer consist of the following:

A steel ring plate is provided between the pressurizer skirt and the supporting concrete slab. The ring serves as a leveling and adjusting member for the pressurizer and may also be used as a template for positioning the concrete anchor bolts.

The upper lateral support consists of struts cantilevered off the compartment walls that bear against the "seismic lugs" provided on the pressurizer.

Structure Intended Functions

Structural supports are in the scope of license renewal because they support and protect components that are within the scope of license renewal. Therefore, safety-related supports are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1).

Nonsafety-related supports are within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(2) when they prevent interaction between safety-related and nonsafety-related components.

Other supports provide support for components credited for fire protection, station blackout, and ATWS and are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3).

STP UFSAR References

Additional details of supports are included in UFSAR Sections 3.8.3.1, 3.8.5.1, and 5.4.14.

Component-Function Relationship Table

The component types subject to aging management review are indicated in Table 2.4-11 - Supports.

Table 2.4-11 Supports

Component Type	Intended Function
Cable Trays and Supports	Structural Support
Conduit And Supports	Shelter, Protection Structural Support
Electrical Panels and Enclosures	Shelter, Protection Structural Support
High Strength Bolting	Structural Support
Instrument Panels and Racks	Structural Support
Supports	Expansion/Separation Structural Support
Supports ASME 1	Structural Support
Supports ASME 2 and 3	Structural Support
Supports HVAC Duct	Structural Support
Supports Instrument	Structural Support
Supports Insulation	Structural Support

Table 2.4-11 Supports (Continued)

Component Type	Intended Function
Supports Mech Equip Class 1	Structural Support
Supports Mech Equip Class 2 and 3	Structural Support
Supports Mech Equip Non ASME	Structural Support
Supports Non ASME	Structural Support

The AMR results for these component types are provided in Table 3.5.2-11, Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Supports.

Table 2.4-12 Component Types Assigned to Supports by Building/Structure

Support Components Associated with Structures	Elect/I&C Components					Mechanical Components								
	Cable Trays and Supports	Conduit and Supports	Electrical Panels and Enclosures	Instrument Panels and Racks	Instrument Supports	ASME Class 1 Pipe Supports	ASME Class 2 and 3 Pipe Supports	Non-ASME Pipe Supports	Mechanical Equipment Class 1 Supports	Mechanical Equipment Class 2 and 3 Supports	Mechanical Equip Non-Code Supports	HVAC Duct Supports	High Strength Bolting	Insulation Supports
Containment Building	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Control Room	x	x	x	x	x		x	x		x	x	x		
Mechanical-Electrical Auxiliary Building	x	x	x	x	x		x	x		x	x	x		x
Turbine Generator Building	x	x	x	x	x			x			x	x		
Diesel Generator Building	x	x	x	x	x		x	x		x	x	x		
Electrical Foundations and Structures	x	x	x	x	x			x			x			
Fuel Handling Building	x	x	x	x	x		x	x		x	x	x		
Essential Cooling Water Structures	x	x	x	x	x		x	x		x	x	x		
Aux. Feedwater Storage Tank Foundation and Shell					x		x	x						
Misc. Yard Areas and Buildings (In Scope)	x	x	x	x	x			x			x			

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL AND INSTRUMENTATION AND CONTROL SYSTEMS

The scoping and screening results for electrical and instrument and control system components consist of a list (Table 2.5-1, Electrical and I&C Component Groups Requiring Aging Management Review) of component types that require aging management review.

Using the "plant spaces" approach, all electrical and instrument and control components were reviewed as a group regardless of the system assigned to each component. Bounding environmental conditions were used to evaluate the identified aging effect(s) with respect to component function(s) to determine the component groups that require aging management review. This methodology is discussed in Section 2.1.3.3 and is consistent with the guidance in NEI 95-10.

The interface of electrical and instrument and control components with other types of components and the assessments of these interfacing components are provided in the appropriate mechanical or structural sections. The evaluation of electrical racks, panels, frames, cabinets, cable trays, conduit, manhole, duct banks, transmission towers and their supports is provided in the structural assessment documented in Section 2.4.

The following electrical component groups were evaluated to determine the groups that require aging management review:

- Cable connections (metallic parts)
- Connector
- High voltage insulators
- Insulated cable and connections (includes the following):
    - Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements
    - Electrical cables and connections used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance
    - Inaccessible medium-voltage electrical cables not subject to 10 CFR 50.49 EQ requirements
- Metal enclosed bus (including the following):
    - Non-Segregated Phase metal enclosed bus
        - Bus bar and connections
        - Bus enclosure

    - Bus Insulation and insulators
  - Isolated Phase metal enclosed bus
    - Bus bar
    - Bus enclosure
    - Bus insulators
- Switchyard bus and connections
- Transmission conductors and connections
- Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements
- Fuse holder (not part of a larger assembly)
- Penetrations, electrical
- Grounding conductors
- Cable tie wraps

License renewal drawing (LR-STP-ELEC-00000E0AAAA) was created based on the electrical one line diagram. The license renewal drawing schematically shows the portions of the plant AC electrical distribution system, including the SBO recovery path, that are included within the scope of license renewal.

2.5.1 Electrical Component Groups

2.5.1.1 Cable Connections (metallic parts)

The cable connections component type includes the metallic portions of cable connections that are located within passive and active equipment.

The function of the cable connections (metallic parts) is to electrically connect specified sections of an electrical circuit to deliver voltage, current or signals.

2.5.1.2 Connector

The connector component type includes the connector contacts for electrical connectors exposed to borated water leakage.

The function of the connections is to electrically connect specified sections of an electrical circuit to deliver voltage, current, or signals.

2.5.1.3 High Voltage Insulators

The high voltage insulators within the scope of license renewal are those associated with the power feeds from the switchyard to the plant that are used to connect the plant to the offsite power. These power feeds are required for the restoration of offsite power to meet the station blackout requirements.

The function of the high voltage insulators is to support and insulate the high voltage transmission conductors and switchyard bus.

2.5.1.4 Insulated Cable and Connections

Electrical insulated cables and connections not subject to environmental qualification requirements of 10 CFR 50.49 were evaluated for aging management based on the comparison of material property capability with environmental conditions. All electrical cables routed within raceway containing cables that feed electrical components that perform license renewal functions are in the scope of license renewal.

The function of insulated cables and connections is to electrically connect specified sections of an electrical circuit to deliver voltage, current or signals. The types of insulated cables includes medium voltage power cables, low voltage power cables, control cables, instrumentation cables and insulated ground cables. The types of insulated connections included in this review are splices, connectors, insulating material of fuse holders, and terminal blocks.

The electrical cables and connections used at STP in instrumentation circuits within the scope of license renewal with sensitive, high voltage, low-level signals are subject to 10 CFR 50.49 EQ requirements. These cables are evaluated as a time-limited aging analysis and are managed under the EQ program as described in Section 4.4.

2.5.1.5 Metal Enclosed Bus

Metal enclosed bus is bus that is enclosed and not part of an active component such as switchgear, load centers, or motor control centers. There are typically three types of metal enclosed bus:

- Isolated phase bus
- Non-segregated phase bus
- Segregated phase bus

The non-segregated phase bus that supports the restoration of offsite power to meet the station blackout requirements are within the scope of license renewal. The following component types are part of the non-segregated phase bus:

- Bus bar and connections
- Bus enclosure

- Bus Insulation and insulators

The isolated phase bus that supports the restoration of offsite power to meet the station blackout requirements are within the scope of license renewal. The following component types are part of the isolated phase bus:

- Bus bar
- Bus enclosure
- Bus insulators

The function of the isolated phase and non-segregated phase buses and connections is to electrically connect specified sections of an electrical circuit to deliver voltage and current.

The function of the bus enclosure is to provide for the expansion and separation of the bus as well as structural support.

The function of the bus insulation is to electrically insulate the non-segregated phase bus bars from each other.

The function of the bus insulators is to support and electrically insulate the non-segregated and isolated phase bus bars from the enclosure.

STP does not use segregated phase bus.

2.5.1.6 Switchyard Bus and Connections

The switchyard buses within the scope of license renewal are those associated with the power feeds from the switchyard to the plant that are used to connect the plant to the offsite power sources. These power feeds are required for the restoration of offsite power to meet the station blackout requirements. The switchyard bus connects the high voltage transmission conductors to the switchyard circuit breakers.

The function of the switchyard buses is to electrically connect specified sections of an electrical circuit to deliver voltage and current.

2.5.1.7 Transmission Conductors and Connections

The high voltage conductors and connections within the scope of license renewal are those associated with the power feeds from the switchyard to the plant that are used to connect the plant to the offsite power. These power feeds are required for the restoration of offsite power to meet the station blackout requirements.

The function of the high voltage conductors and connectors is to supply offsite power to various plant systems.

2.5.1.8 Electrical Equipment Subject to 10CFR50.49 Environmental Qualification (EQ) Requirements

Electrical equipment subject to 10 CFR 50.49 EQ requirements is evaluated as a time-limited aging analysis and is managed under the environmental qualification program as described in Section 4.4.

2.5.1.9 Fuse Holders

The fuse holders within the scope of license renewal at STP are part of larger assemblies. STP does not have any stand-alone fuse holders within the scope of license renewal. The aging of fuse holders within the scope of license renewal at STP is managed as part of the active component that includes the fuse holder.

2.5.1.10 Penetrations Electrical

Primary containment electrical penetrations at STP are within the scope of license renewal. The electrical continuity of the environmentally qualified penetrations is managed under the environmental qualification program, and evaluated as a time-limited aging analysis. The pressure boundary function of all electrical penetrations is evaluated in Section 2.4.1, Containment Building.

STP has no non-EQ electrical penetrations.

2.5.1.11 Grounding Conductors

Uninsulated grounding conductors bond metal raceways, building structural steel, and plant equipment to earth ground through an installed grounding grid. The uninsulated grounding conductors are nonsafety-related and provide for personnel and equipment protection. The grounding conductors do not prevent faults and are not required for equipment operation. Failure of a grounding conductor cannot affect the accomplishment of any safety functions. Therefore, the grounding conductors do not perform an intended function that meets the criteria of 10 CFR 54.4(a) and are not within the scope of license renewal.

2.5.1.12 Cable Tie Wraps

Cable tie wraps are used as an aid during cable installation to establish power cable spacing in cable trays. Once the cables have been installed and are in place, the cable's own weight in the tray and the inherent rigidity of the Class B copper stranding will continue to maintain the spacing. This spacing provides a path for natural circulation of air through the cables in the tray. Tie wraps are not credited in STP seismic qualification of the cable tray support system.

The CLB and design documents were reviewed to determine that cable tie wraps perform no license renewal functions and failure of cable tie wraps would not prevent any safety-related equipment from performing its intended functions. STP has no CLB requirements that cable tie wraps remain functional during and following design-basis events. Therefore, the tie wraps do not perform an intended function that meets the criteria of 10 CFR 54.4(a) and are not within the scope of license renewal.

2.5.2 Electrical Component Groups Subject to Aging Management Review

The electrical and instrument and control component groups requiring an AMR and their intended functions are indicated in Table 2.5-1, Electrical and I&C Component Groups Requiring Aging Management Review.

Table 2.5-1 – Electrical and I&C Component Groups Requiring Aging Management Review

Component Type	Intended Function
Cable Connections (Metallic Parts)	Electrical Continuity
Connector	Electrical Continuity
High Voltage Insulator	Expansion/Separation Insulate (Electrical) Structural Support
Insulated Cable and Connections	Electrical Continuity Insulate (Electrical)
Metal Enclosed Bus (Bus and Connections)	Electrical Continuity
Metal Enclosed Bus (Enclosure)	Expansion/Separation Structural Support
Metal Enclosed Bus (Insulation and Insulators)	Insulate (Electrical)
Switchyard Bus and Connections	Electrical Continuity
Transmission Conductors and Connections	Electrical Continuity

The AMR results for these component types are provided in Table 3.6.2-1, Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components.

CHAPTER 3

AGING MANAGEMENT REVIEW RESULTS

3.0 AGING MANAGEMENT REVIEW RESULTS

Chapter 3 provides the results of the aging management review (AMR) for those structures and component types identified in Chapter 2 as being subject to AMR. Organization of this chapter is based on Tables 1 through 6 of Volume 1 of NUREG-1801, *Generic Aging Lessons Learned (GALL)*, dated September 2005 and Chapter 3, Aging Management Review Results, of NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, Revision 1, dated September 2005.

The major sections of this chapter are:

- Aging Management of Reactor Vessel, Internals, and Reactor Coolant System (Section 3.1)
- Aging Management of Engineered Safety Features (Section 3.2)
- Aging Management of Auxiliary Systems (Section 3.3)
- Aging Management of Steam and Power Conversion System (Section 3.4)
- Aging Management of Containments, Structures, and Component Supports (Section 3.5)
- Aging Management of Electrical and Instrument and Controls (Section 3.6)

Descriptions of the internal and external service environments that were used in the AMR to determine aging effects requiring management are included in Table 3.0-1, Mechanical Environments, Table 3.0-2, Structural Environments, and Table 3.0-3, Electrical and Instrument and Controls Environments. The environments used in the AMRs are listed in the Evaluated Environment column.

The AMR results in Chapter 3 are presented in the following types of tables:

• **Table 3.x.1** - where '**3.x**' indicates the LRA section number from NUREG-1800, and '**1**' indicates that this is the first table type in Section 3.x. For example, in the Reactor Coolant System subsection, this table would be number 3.1.1. For ease of discussion, this table type will hereafter be referred to in this chapter as "Table 1."

• **Table 3.x.2-y** - where '**3.x**' indicates the LRA section number from NUREG-1800, and '**2**' indicates that this is the second table type in Section 3.x; and 'y' indicates the system table number. For example, for the Reactor Vessel and Internals, within the Reactor Vessel, Internals, and Reactor Coolant System subsection, the Table would be Table 3.1.2-1 and for the Reactor Coolant System, it would be Table 3.1.2-2. For the Containment Spray System, within the Engineered Safety Features subsection, this Table would be Table 3.2.2-1. This table type will hereafter be referred to in this chapter as "Table 2."

Table Description

NUREG-1801 contains the staff's generic evaluation of existing plant programs. It documents the technical basis for determining where existing programs are adequate without modification, and where existing programs should be augmented for the extended period of operation. The evaluation results documented in the report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components, within the scope of license renewal, without change. The report also contains recommendations on specific areas for which existing programs should be augmented for license renewal. In order to take full advantage of NUREG-1801, a comparison between the AMR results and the tables of NUREG-1801 has been made. The results of that comparison are provided in the two tables.

Table 1

The purpose of Table 1 is to provide a summary comparison of how STP aligns with the corresponding tables of NUREG-1801, Volume 1. The table is similar to Tables 1 through 6 provided in NUREG-1801, Volume 1, except that the "Type" column and the "Unique Item" column are not included. The "ID" column has been replaced by an "Item Number" column and the "Related Generic Item" column has been replaced by a "Discussion" column. The "Item Number" column provides the reviewer with a means to cross-reference from Table 2 to Table 1. The "Discussion" column is used by the applicant to provide clarifying/amplifying information. The following are examples of information that might be contained within this column:

- "Further Evaluation Recommended" information or reference to where that information is located. The name of a plant specific program being used.
- Exceptions to the NUREG-1801 assumptions
- A discussion of how the line is consistent with the corresponding line item in NUREG-1801, Volume 1
- A discussion of how the item is different than the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent (e.g., when there is exception taken to an aging management program that is listed in NUREG-1801, Volume 1)

The format of Table 1 provides the reviewer with a means of aligning a specific Table 1 line with the corresponding NUREG-1801, Volume 1 table line, thereby allowing for the ease of review.

Table 2

Table 2 provides the detailed results of the AMRs for those component types identified in Chapter 2 as being subject to AMR. There is a Table 2 for each of the systems and structures identified in Chapter 2 that have components within the scope of license renewal.

Table 2 consists of the following nine columns:

- Component Type
- Intended Function
- Material
- Environment
- Aging Effect Requiring Management
- Aging Management Program
- NUREG-1801 Volume 2 Item
- Table 1 Item
- Notes

Component Type

The first column identifies all of the component types from Chapter 2 that are subject to AMR. They are listed in alphabetical order.

Intended Function

The second column contains the license renewal intended functions (including abbreviations where applicable) for the listed component type. Definitions and abbreviations of intended functions are contained in Table 2.1-1, Intended Functions – Abbreviations and Definitions.

Material

The third column lists the particular materials of construction for the component types.

Environment

The fourth column lists the environments to which the component types are exposed. Internal and external environments are indicated and a listing and descriptions of these environments is provided in Table 3.0-1, Mechanical Environments, Table 3.0-2, Structural Environments, and Table 3.0-3, Electrical and Instrument and Control Environments. The three tables compare the evaluated environments to the environments listed in NUREG-1801 tables and the NUREG-1801, Volume 2, Chapter 9.D environments. The description column and NUREG-1801 column of the three tables provides specific environment considerations to be used when determining the NUREG-1801 Volume 2 consistency that is presented in column seven of Table 2. For example, stainless steel components that are exposed to a treated borated water, secondary water, or closed cycle cooling water environment of >60°C (140°F), the aging effect of cracking would also apply.

Aging Effect Requiring Management

As part of the AMR process, aging effects requiring management for the material and environment combination in order to maintain the intended function of the component type are determined. These aging effects requiring management are listed in column five.

Aging Management Programs

The aging management programs used to manage the aging effects requiring management are listed in column six of Table 2.

NUREG-1801 Vol. 2 Item

Each combination of component type, material, environment, aging effect requiring management, and aging management program that is listed in Table 2, is compared to NUREG-1801, Volume 2 with consideration given to the standard notes, to identify consistencies. When they are identified, they are documented by noting the appropriate NUREG-1801, Volume 2 item number in column seven of Table 2. If there is no corresponding item number in NUREG-1801, Volume 2, this line in column seven is marked "none." That way, a reviewer can readily identify where there is correspondence between the plant specific tables and the NUREG-1801, Volume 2 tables.

Table 1 Item

Each combination of component, material, environment, aging effect requiring management, and aging management program that has an identified NUREG-1801 Volume 2 item number must also have a Table 3.x.1 line item reference number. The corresponding line item from Table 1 is listed in column eight of Table 2. If there is no corresponding item in NUREG-1801, Volume 1, this row in column eight is left blank. That way, the information from the two tables can be correlated.

Notes

In order to realize the full benefit of NUREG-1801, a series of notes is established to identify how the information in Table 2 aligns with the information in NUREG-1801, Volume 2. All note references with letters are standard notes that will be the same from application to application throughout the industry. Any notes the plant requires which are in addition to the standard notes will be identified by a number and deemed plant specific.

Standard Notes used in this application include:

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

B. Consistent with NUREG-1801 item for component, material, environment and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

E. Consistent with NUREG-1801 item for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.

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

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

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

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

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

TABLE USAGE

Table 1

The reviewer evaluates each row in Table 1 by moving from left to right across the table. Since the Component Type, Aging Effect/Mechanism, Aging Management Programs and Further Evaluation Recommended information is taken directly from NUREG-1801, Volume 1, no further analysis of those columns is required. The information intended to help the reviewer the most in this table is contained within the discussion column. Here the reviewer is given information necessary to determine, in summary, how the STP evaluations and programs align with NUREG-1801, Volume 1. This may be in the form of descriptive information within the Discussion column or the reviewer may be referred to other locations within the LRA.

Table 2

Table 2 contains all of the AMR information for the plant, whether or not it aligns with NUREG-1801. For a given row within the table, the reviewer is able to see the intended function, material, environment, aging effect requiring management and aging management program combination for a particular component type within a system. In addition, if there is a correlation between the combination in Table 2 and a combination in NUREG-1801, Volume 2, this will be identified by a referenced item number in column seven, NUREG-1801, Volume 2 Item. The reviewer can refer to the item number in NUREG-1801, Volume 2, if desired, to verify the correlation. If the column is blank, the corresponding combination in NUREG-1801, Volume 2 is marked as “none.” As the reviewer continues across the table from left to right, within a given row, the next column is labeled Table 1

Item. If there is a reference number in this column, the reviewer is able to use that reference number to locate the corresponding row in Table 1 and see how the aging management program for this particular combination aligns with NUREG-1801.

Table 2 provides the reviewer with a means to navigate from the component types subject to AMR in Chapter 2 all the way through the evaluation of the programs that will be used to manage the effects of aging of those component types.

A listing of the acronyms used in this Chapter is provided in Section 1.5.

Table 3.0-1 Mechanical Environments

Mechanical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Atmosphere/ Weather	Air – Outdoor	The atmosphere/weather environment consists of moist, ambient temperatures, humidity, and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions. Temperature extremes range from 8° F to 107° F.
	Air – Outdoor (External) (includes salt-laden atmospheric air and salt water spray)	
	Air – Indoor and Outdoor	
Borated Water Leakage	Air With Reactor Coolant Leakage.	The borated water leakage environment applies in plant indoor and outdoor areas that include components and systems that contain borated water and that could leak on nearby components or structures.
	Air With Borated Water Leakage.	
	Air With Reactor Coolant Leakage (Internal) (RPV Leak Detection Line IV.A2-5)	
	Air With Metal Temperature up to 288º C (550º F) [Pressurizer Integral Support - IV.C2-16]	
	System Temperature up to 340º C (644º F) [Steam Generator Closure Bolting and TLAA]	
Buried	Soil	Components/equipment that are buried in soil. Soil is a mixture of inorganic materials produced by the weathering of rocks and clays, and organic material produced by decomposition of vegetation. Voids containing air and moisture occupy about 50 percent of the soil volume. Properties of soil that can affect aging include water content, pH, ion exchange capacity, density, and permeability. External environment for components exposed to soil (including air/soil interface) or buried in the soil, including groundwater in the soil. The groundwater has been determined to be non-aggressive.
Closed Cycle Cooling Water	Closed Cycle Cooling Water	Water for component cooling that is treated and monitored for quality under the Closed-Cycle Cooling Water System program.
	Closed Cycle Cooling Water >60º C (140º F) [SCC Threshold for Stainless Steel]	
	Treated Water	

Table 3.0-1 Mechanical Environments (Continued)

Mechanical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Demineralized Water	Treated Water	Demineralized water or chemically purified water which is the source for water in all clean systems such as the primary or secondary coolant systems. Demineralized water is monitored for quality under the Water Chemistry program and depending on the system; demineralized water may require additional processing.
Diesel Exhaust	Diesel Exhaust [VII H2-1 & H2-2]	Gases, fluids, particles present in diesel engine exhaust.
Dry Gas	Dried Air [Common Miscellaneous Material/Environments]	Internal gas environments from dry air (conditioned to reduce the dew point well below the system operating temperature), inert or non-reactive gases. Includes compressed instrument air, nitrogen, oxygen, hydrogen, helium, halon, CO_2 or freon.
	Gas [Common Miscellaneous Material/Environments]	
Encased in Concrete	Concrete	Piping or components that are encased in concrete.
Fuel Oil	Fuel Oil	Diesel fuel oil or liquid hydrocarbons used to fuel diesel engines. Fuel oil is monitored for the possibility of water and microbiological organisms by the Fuel Oil Chemistry program.
Lubricating Oil	Lubricating Oil	Lubricating oils, including hydraulic oils, are low-to-medium viscosity hydrocarbons, with the possibility of containing contaminants and/or moisture, used for bearing, gear, and engine lubrication and in valve actuators. Lubricating oil and hydraulic oils are monitored for the possibility of water by the Lubricating Oil Analysis program.
Plant Indoor Air (When used as Internal)	Condensation (Internal)	Indoor air or non-dried compressed gas with temperatures higher than the dew point. Condensation can occur, but only rarely;
	Air [Glass Piping Elements VII.J-7 and VIII.I-4]	

Table 3.0-1 Mechanical Environments (Continued)

Mechanical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
	Moist Air or Condensation [Diesel Piping Components VII.H2-21]	equipment surfaces are normally dry. Plant indoor air (internal) or non-dried compressed gas is evaluated with the NUREG-1801 environment of condensation when the air contains significant amounts of moisture (enough to cause loss of material) and the internal surface has temperatures below the dew point. Plant Indoor Air is evaluated with the NUREG-1801 environment of condensation when used for the drains associated with the internal surfaces exposed to condensation. Plant indoor air environments evaluated with condensation or moist air are considered to be potentially aggressive when surface contaminants are present.
Plant Indoor Air (When used as External)	Air – Indoor Uncontrolled (External) Air – Indoor Uncontrolled (Internal/External) Air Indoor Air – Indoor Controlled (External) [VII.J-1 and VIII.I-13] Air With Leaking Secondary Side Water and/or Steam [Steam Generator (Once Through) – IV.D2-5] Air With Steam or Water Leakage [Closure Bolting] Condensation (External)	Indoor air with temperatures higher than the dew point. Condensation can occur, but only rarely; equipment surfaces are normally dry. Plant indoor air is evaluated with the NUREG-1801 environment of condensation when the air contains significant amounts of moisture (enough to cause loss of material) and the external surface has temperatures below the dew point. Plant indoor air is evaluated with the NUREG-1801 environment of condensation when used for the drains associated with the external surfaces exposed to condensation. Plant indoor air environments evaluated with condensation or moist air are considered to be potentially aggressive when surface contaminants are present.
Potable Water	This Environment is not in NUREG-1801	Water treated for drinking or other personnel uses.
Raw Water	Raw Water	Water from the circulating water system or ultimate heat sink for use in open-cycle cooling systems. Floor drains and building sumps may be exposed to a variety of untreated water that is classified as raw water for the determination of aging effects. Raw water may contain contaminants, including oil and boric acid, as well as originally treated water that is not monitored by a chemistry program.

Table 3.0-1 Mechanical Environments (Continued)

Mechanical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Reactor Coolant	Reactor Coolant	Water in reactor coolant systems at or near full operating temperature that is treated and monitored for quality under the Water Chemistry program.
	Reactor Coolant >250º C (>482º F) [Thermal Embrittlement Threshold for CASS]	
	Reactor Coolant and Neutron Flux [Neutron Irradiation Embrittlement]	
	Reactor Coolant >250º C (>482º F) and Neutron Flux [[Thermal Embrittlement Threshold for CASS and Neutron Irradiation Embrittlement]	
	Reactor Coolant and Secondary Feedwater/Steam [TLAA IV.D1-21]	
	Reactor Coolant/Steam [RCS Piping IV.C2-13 and Pressurizer IV. C2-24]	
Secondary Water	Treated Water	Steam generator secondary systems water (including condensate, feedwater and steam) that is treated and monitored for quality under the Water Chemistry program and controlled for protection of steam generators.
	Treated Water >60º C (140º F) [SCC Threshold for Stainless Steel]	
	Secondary Feedwater/Steam	
	Secondary Feedwater	
Steam	Steam	Secondary water that has been converted to steam or heating and process steam produced from the auxiliary boiler.
Submerged (Note: Use Appropriate Internal Environment)	Use Appropriate Internal Environment	Components/equipment that are completely or partially submerged in: • Water (operating or process fluid) • Oil/fluids (lube, fuel, electro-hydraulic, etc.) The environment for submerged components will be identified using one of the internal environments previously identified.

Table 3.0-1 Mechanical Environments (Continued)

Mechanical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Sodium Hydroxide	This Environment is not in NUREG-1801	Treated water with elevated pH due to the presence of NaOH. Sodium hydroxide and Lithium Hydroxide are used in the regeneration process for demineralizer resins, and as a water treatment chemical to achieve and maintain an elevated pH in some treated water applications.
Treated Borated Water	Treated Borated Water	Treated water with boric acid that is monitored for quality under the Water Chemistry program.
	Treated Borated Water >60º C (140º F) [SCC Threshold for Stainless Steel]	
	Treated Borated Water >250º C (482º F) [Thermal Embrittlement Threshold for CASS]	
Ventilation Atmosphere	Air – Indoor Uncontrolled	Atmospheric/room/building air for ventilation systems with temperatures higher than the dew point. Condensation can occur but only rarely, equipment surfaces are normally dry. Ventilation atmosphere is evaluated with the NUREG-1801 environment of condensation when the air contains significant amounts of moisture (enough to cause loss of material) and the internal surface or external surface have temperatures below the dew point. Ventilation atmosphere is evaluated with the NUREG-1801 environment of condensation when used for the drains associated with the internal or external surfaces exposed to condensation. Ventilation atmosphere environments evaluated with condensation are considered to be potentially aggressive when surface contaminants are present. Also the environment to which the external surface of components inside HVAC systems is exposed.
	Condensation (Internal)	
	Air – Indoor Uncontrolled (Internal/External)	
	Air – Indoor Controlled (External)	
Zinc Acetate	This Environment is not in NUREG-1801	Zinc Acetate solution is used in the zinc injection system to add zinc to the reactor coolant system before shutdown to reduce the radioactivity of the RCS during refueling outages.

Table 3.0-2 Structural Environments

Structural Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Atmosphere/ Weather (Structural)	Any [Reaction With Aggregates]	Structures are subject to the same conditions covered in Atmosphere/Weather External Mechanical Environment. The atmosphere/weather environment consists of moist, ambient temperatures, humidity, and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions. Temperature extremes range from 8° F to 107° F.
	Air – Outdoor (includes salt-laden atmospheric air and salt water spray)	
	Soil [Cracks and Distortion Due to Increased Stress Levels From Settlement]	
	Water - Flowing[Leaching of Calcium Hydroxide, Loss of Material, Loss Of Form]	
	Various [Elastomers III A6-12]	
Borated Water Leakage	Air With Borated Water Leakage [Supports]	The borated water leakage environment applies in plant indoor and outdoor areas that include components and systems that contain borated water and that could leak on nearby components or structures.

Table 3.0-2 Structural Environments (Continued)

Structural Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Buried (Structural)	Any [Reaction With Aggregates] Groundwater/Soil Soil [Cracks and Distortion Due to Increased Stress Levels From Settlement] Water – Flowing [Leaching of Calcium Hydroxide] Air – Outdoor [Freeze Thaw] Water - Flowing Under Foundation [Porous Concrete Sub-foundation] Various [Elastomers III A6-12]	Structures/components that are buried in soil. Soil is a mixture of inorganic materials produced by the weathering of rocks and clays, and organic material produced by decomposition of vegetation. Voids containing air and moisture occupy about 50 percent of the soil volume. Properties of soil that can affect aging include water content, pH, ion exchange capacity, density, and permeability. The groundwater has been determined to be non-aggressive. Structures/components that are buried and may be exposed to: • Soil, dry under normal conditions • Soil with groundwater present • Flowing water causing possible leaching condition • Foundation aging • Soft soil and settlement issues • An aggressive environment caused by contaminants in the soil
Encased in Concrete	Not a NUREG-1801 Structural Environment: See NUREG-1801 Mechanical Item	Components that are encased in concrete.
Plant Indoor Air (Structural)	Any [Reaction With Aggregates] Air - Indoor Uncontrolled Soil [Cracks and Distortion Due to Increased Stress Levels From Settlement] Various [Elastomers III A6-12]	Structures are subject to the same conditions covered in Plant Indoor Air External Mechanical Environment. Indoor air on structures with temperatures higher than the dew point, i.e., condensation can occur but only rarely, structural surfaces are normally dry.
Submerged (Structural)	Water – Standing [Tanks, Earthen Water Control Structures, and Water Control Structures Metal Components] Water – Flowing (includes Raw Water which includes untreated salt water) [Abrasion/Cavitation (concrete),	Structures that are completely or partially covered, or structures that are partially filled (such as tanks, sumps, etc.) with: • Water (operating or process fluid) Structures that are exposed to flowing water conditions potentially causing:

Table 3.0-2 Structural Environments (Continued)

Structural Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
	Earthen Water Control Structures, and Water Control Structures Metal Components]	• Abrasion • Cavitation • Leaching • Loss of Material • Loss of Form
	Treated Water or Treated Borated Water [Fuel Pool Liner]	
	Treated Water <60ºC (<140ºF) [Supports]	

Table 3.0-3 Electrical and Instrument and Controls Environments

Electrical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Adverse Localized Environment	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Adverse localized environments can be due to any of the following: (1) exposure to moisture and voltage (2) heat, radiation, or moisture, in the presence of oxygen (3) heat, radiation, or moisture, in the presence of oxygen or >60-year service limiting temperature, or (4) adverse localized environment caused by heat, radiation, oxygen, moisture, or voltage. The term “>60-year service limiting temperature” refers to that temperature that exceeds the temperature below which the material has a 60-year or greater service lifetime.
Atmosphere/Weather	Air Outdoors	The atmosphere/weather environment consists of moist, ambient temperatures, humidity, and exposure to weather, including precipitation and wind. The component is exposed to air and local weather conditions including salt spray. Temperature extremes range from 8° F to 107° F. There is no exposure to industry air pollution or other aggressive contaminants.

Table 3.0-3 Electrical and Instrument and Controls Environments (Continued)

Electrical Environments		
Evaluated Environment	**NUREG-1801 Environment**	**Description**
Borated Water Leakage	Air with Borated Water Leakage	The borated water leakage environment applies in plant indoor and outdoor areas that include components and systems that contain borated water and that could leak on nearby components or structures.
Plant Indoor Air	Air Indoor	Indoor air on electrical components with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry.

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 Introduction

Section 3.1 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.3.1, Reactor Vessel, Internals, and Reactor Coolant System, subject to AMR. These systems are described in the following sections:

- Reactor vessel and internals (Section 2.3.1.1)
- Reactor coolant system (Section 2.3.1.2)
- Pressurizer (Section 2.3.1.3)
- Steam generators (Section 2.3.1.4)

Table 3.1.1, Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System, provides the summary of the programs evaluated in NUREG-1801 that are applicable to the component types in this section. Table 3.1.1 uses the format of Table 1 described in Section 3.0.

3.1.2 Results

The following tables summarize the results of the AMR for the systems in the Reactor Vessel, Internals, and Reactor Coolant System area:

- Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals
- Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System
- Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer
- Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators

These tables use the format of Table 2 discussed in Section 3.0.

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

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.1.2.1.1 Reactor Vessel and Internals

Materials

The materials of construction for the reactor vessel and internals component types are:

- Carbon Steel
- Carbon Steel with Stainless Steel Cladding
- High Strength Low Alloy Steel (Bolting)
- Nickel-Alloys
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The reactor vessel and internals components are exposed to the following environments:

- Borated Water Leakage
- Reactor Coolant

Aging Effects Requiring Management

The following reactor vessel and internals aging effects require management:

- Changes in dimensions
- Cracking
- Loss of fracture toughness
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the reactor vessel and internals component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Boric Acid Corrosion (B2.1.4)
- Flux Thimble Tube Inspection (B2.1.21)
- Nickel-Alloy Aging Management (B2.1.34)
- Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)
- PWR Reactor Internals (B2.1.35)
- Reactor Head Closure Studs (B2.1.3)
- Reactor Vessel Surveillance (B2.1.15)
- Water Chemistry (B2.1.2)

For Reactor Coolant System Nickel-Alloy Pressure Boundary Components, STP will:

(1) Implement applicable NRC Orders, Bulletins and Generic Letters associated with nickel-alloys; (2) implement staff-accepted industry guidelines, (3) participate in the industry initiatives, such as owners group programs and the EPRI Materials Reliability Program, for managing aging effects associated with nickel-alloys, and (4) upon completion of these programs, but not less than 24 months before entering the period of extended operation, STP will submit an inspection plan for reactor coolant system nickel-alloy pressure boundary components to the NRC for review and approval.

For Reactor Vessel Internals, STP will:

(1) Participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, STP will submit an inspection plan for reactor internals to the NRC for review and approval.

3.1.2.1.2 Reactor Coolant System

Materials

The materials of construction for the reactor coolant system component types are:

- Carbon Steel

- Insulation Calcium Silicate
- Insulation Fiberglass
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The reactor coolant system component types are exposed to the following environments:

- Borated Water Leakage
- Demineralized Water
- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Reactor Coolant
- Treated Borated Water

Aging Effects Requiring Management

The following reactor coolant system aging effects require management:

- Cracking
- Loss of fracture toughness
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the reactor coolant system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.19)
- Water Chemistry (B2.1.2)

3.1.2.1.3 Pressurizer

Materials

The materials of construction for the pressurizer component types are:

- Carbon Steel
- Carbon Steel with Stainless Steel Cladding
- Nickel-Alloys
- Stainless Steel

Environment

The pressurizer component types are exposed to the following environments:

- Borated Water Leakage
- Reactor Coolant

Aging Effects Requiring Management

The following pressurizer aging effects require management:

- Cracking
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the pressurizer component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)

- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.1.2.1.4 Steam Generators

Materials

The materials of construction for the steam generator component types are:

- Carbon Steel
- Carbon Steel with Stainless Steel Cladding
- Nickel-Alloys
- Stainless Steel

Environment

The steam generator component types are exposed to the following environments:

- Borated Water Leakage
- Plant Indoor Air
- Reactor Coolant
- Secondary Water

Aging Effects Requiring Management

The following steam generator aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the steam generator component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)

- Boric Acid Corrosion (B2.1.4)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Steam Generator Tubing Integrity (B2.1.8)
- Water Chemistry (B2.1.2)

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation by the reviewer in the License Renewal Application. For the reactor vessel, internals, and reactor coolant system, those evaluations are addressed in the following subsections.

3.1.2.2.1 Cumulative Fatigue Damage

Analysis of cumulative fatigue damage in the reactor pressure vessel and internals; reactor coolant pumps, pressurizer; primary side of the steam generators; reactor coolant pressure boundary piping, valves, and other components; and of those steam generator secondary-side components with a fatigue analysis are TLAAs as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1).

[3.1.1.05] STP reactor vessel internals are designed to ASME III, Subsection NG, some with a fatigue analysis. Section 4.3.3 describes the evaluation of these TLAAs.

[3.1.1.06] Cumulative fatigue damage of steam generator tubes is not a TLAA as defined in 10 CFR 54.3. See Section 4.3.2.5.

[3.1.1.07] Reactor coolant pressure boundary closure bolting (RPV head studs, pump, valve, and pressurizer and steam generator manway and port bolting) and pressurizer vessel support skirts and attachment welds are designed to ASME Class 1, with a fatigue analysis. The steam generator primary and secondary shells, integral supports, nozzles, and bolting have a Class 1 fatigue analysis. The pressurizer relief tank is not an ASME III Class 1 component, nor is it designed to other fatigue or cyclic design rules, and therefore has no fatigue TLAA.

Section 4.3.2.1 describes the evaluation of these TLAAs for reactor vessel closure bolting and welded attachments.

Section 4.3.2.3 describes the evaluation of these TLAAs for the reactor coolant pump, its closure bolting, and its integral supports.

Section 4.3.2.4 describes the evaluation of these TLAAs for pressurizer closure bolting, its support skirt, and welded attachments.

Section 4.3.2.5 describes the evaluation of these TLAAs for steam generator primary and secondary-side pressure boundaries, feedwater nozzles, closure bolting and welded attachments.

Section 4.3.2.6 describes the evaluation of these TLAAs for Class 1 valves, including their bolting.

Section 4.3.2.7 describes the evaluation of these TLAAs for piping and piping components.

[3.1.1.08] Reactor coolant pressure boundary piping and the pressurizer are designed to ASME III, Class 1, with fatigue analyses.

Section 4.3.2.4 describes the evaluation of these TLAAs for the pressurizer vessel, heater sleeves, closures, nozzles, and safe ends.

Section 4.3.2.7 describes the evaluation of these TLAAs for piping, piping nozzles, safe ends, and other piping components.

[3.1.1.09] The reactor vessel pressure boundary is designed to ASME III, Class 1, with fatigue analyses.

Section 4.3.2.1 describes the evaluation of these TLAAs for the reactor vessel, including the shell, heads, flanges, penetrations, welds, nozzles, and safe end butters.

Section 4.3.2.2 describes the evaluation of these TLAAs for the control element drive mechanism housings.

[3.1.1.10] The steam generator primary and secondary pressure boundaries are designed respectively to ASME III Class 1 and 2, but both the steam generator primary and secondary shells and nozzles have a Class 1 fatigue analysis.

Section 4.3.2.5 describes the evaluation of these TLAAs for steam generator primary and secondary-side pressure boundaries including the heads, feedwater nozzles, other nozzles, and closures.

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

3.1.2.2.2.1 PWR steam generator shell assembly exposed to feedwater and steam

Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used.

3.1.2.2.2.2 BWR isolation condenser components exposed to reactor coolant

Not applicable to STP, applicable to BWR only.

3.1.2.2.2.3 Reactor vessel components exposed to reactor coolant

Not applicable to STP, applicable to BWR only.

3.1.2.2.2.4 Steam generator shell and transition cone exposed to secondary feedwater and steam

Augmented inspection is recommended for Westinghouse Model 44 and 51 steam generators, where a high stress region exists at the shell to transition cone weld, if general and pitting corrosion of the shell is known to exist. The steam generators at STP are Westinghouse Model Delta 94, so the augmented inspection is not applicable.

3.1.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement

3.1.2.2.3.1 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement - TLAA

Evaluation of loss of fracture toughness is a TLAA as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1).

Due primarily to low-leakage cores, the revised 54 EFPY fluence projections are less than the 32 EFPY UFSAR projections. Recent coupon examinations demonstrated that adequate adjusted reference temperature, upper shelf energy, and pressurized thermal shock screening temperature margin will remain at the end of a 60-year period of extended operation; and therefore that subsequent revisions to pressure-temperature limits will provide adequate operating margin, without the use of special methods.

Section 4.2 describes the evaluation of these neutron embrittlement TLAAs.

Loss of fracture toughness for the reactor pressure vessel shell and nozzles is managed by the Reactor Vessel Surveillance program (B2.1.15).

3.1.2.2.3.2 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement – Reactor Vessel Surveillance program

The Reactor Vessel Surveillance program (B2.1.15) manages loss of fracture toughness due to neutron irradiation embrittlement in the reactor vessel beltline shell, nozzles, and welds exposed to reactor coolant and neutron flux.

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

3.1.2.2.4.1 BWR top head enclosure, vessel flange leak detection lines

Not applicable to STP, applicable to BWR only.

3.1.2.2.4.2 BWR isolation condenser components exposed to reactor coolant

Not applicable to STP, applicable to BWR only.

3.1.2.2.5 Crack Growth due to Cyclic Loading

An analysis of crack growth of underclad flaws in reactor vessel forgings due to cyclic loading to qualify them for the current licensed operating period would be a TLAA. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1). No underclad flaws have been detected or analyzed for the STP vessel and therefore is not a TLAA. Section 4.7.4 describes the evaluation of this effect in the STP reactor vessel for the period of extended operation.

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

Loss of fracture toughness due to neutron irradiation embrittlement and void swelling for stainless steel reactor internals components exposed to reactor coolant is managed by the plant-specific PWR Reactor Internals program (B2.1.35) based on the guidelines provided in EPRI 1016596 (MRP-227). Consistent with EPRI 1016596 (MRP-227), loss of fracture toughness is not an applicable aging effect requiring management for the RVI neutron shield panel.

3.1.2.2.7 Cracking due to Stress Corrosion Cracking

3.1.2.2.7.1 PWR stainless steel reactor vessel flange leak detection lines

For managing the aging effect of cracking due to stress corrosion cracking for stainless steel high pressure conduits (flux thimble guide tubes to seal table) exposed to reactor coolant, Water Chemistry (B2.1.2) is augmented by ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1). For stainless steel flux thimble tube exposed to reactor coolant, cracking due to SCC is managed by Water Chemistry (B2.1.2). The STP reactor vessel flange leak detection line is made of nickel-alloy that is normally empty without O-ring leakage.

3.1.2.2.7.2 CASS reactor coolant system piping and components exposed to reactor coolant

For managing the aging effect of cracking due to stress corrosion cracking for cast austenitic stainless steel piping components exposed to reactor coolant, Water Chemistry (B2.1.2) is augmented by ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) to ensure that adequate inspection methods ensure detection of cracks.

Although the carbon contents for RCS fittings and piping pieces do not meet the NUREG-0313 criterion of less than 0.035 percent, STP has determined that the molybdenum and ferrite values are below the industry accepted thermal aging embrittlement screening threshold. Therefore, these cast austenitic stainless steel reactor coolant piping components are not susceptible to the aging effect of thermal aging embrittlement and it is not required to include flaw evaluation methodology for these CASS components.

3.1.2.2.8 Cracking due to Cyclic Loading

3.1.2.2.8.1 BWR jet pump sensing lines

Not applicable to STP, applicable to BWR only.

3.1.2.2.8.2 BWR isolation condenser components exposed to reactor coolant

Not applicable to STP, applicable to BWR only.

3.1.2.2.9 Loss of Preload due to Stress Relaxation

Loss of preload due to stress relaxation for nickel-alloy and stainless steel reactor internals components exposed to reactor coolant is managed by the plant-specific PWR Reactor Internals program (B2.1.35) based on the guidelines provided in EPRI 1016596 (MRP-227). Consistent with EPRI 1016596 (MRP-227), loss of preload is not an applicable aging effect requiring management for the RVI Lower Core Support-Clevis Insert Bolting and RVI Upper Support Column Bolting.

3.1.2.2.10 Loss of Material due to Erosion

Not applicable. STP steam generators do not have feedwater impingement plates, so the applicable NUREG-1801 line was not used.

3.1.2.2.11 Cracking due to Flow Induced Vibration

Not applicable to STP, applicable to BWR only.

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

For managing the aging effect of cracking due to stress corrosion cracking and irradiation-assisted stress corrosion cracking of stainless steel reactor internals components exposed to reactor coolant, Water Chemistry (B2.1.2) is augmented by the plant-specific PWR Reactor Internals program (B2.1.35) based on the guidelines provided in EPRI 1016596 (MRP-227). Consistent with EPRI 1016596 (MRP-227), cracking is not an applicable aging effect requiring management for the following components:

- RVI Hold Down Spring
- RVI Neutron Shield Panel
- RVI Upper Core Support-Upper Core Plate
- RVI Upper Core Support-Upper Support Column
- RVI Upper Core Support-Upper Support Column Base
- RVI Upper Core Support-Upper Support Plate

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

For managing the aging effect of cracking due to primary water stress corrosion cracking of reactor vessel internal nickel-alloy components exposed to reactor coolant, Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) is augmented by Nickel-Alloy Aging Management (B2.1.34) (pressure boundary components only), and comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines).

For managing the aging effect of cracking due to primary water stress corrosion cracking of pressurizer and steam generator components made of Alloy 690 exposed to reactor coolant, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) and Water Chemistry (B2.1.2) are credited.

3.1.2.2.14 Wall Thinning due to Flow-Accelerated Corrosion

Feedring wall thinning was described in NRC Information Notice 91-19. This condition is not applicable to the model steam generators installed at STP and no action is required, however, the Water Chemistry program (B2.1.2) and the Steam Generator Tubing Integrity program (B2.1.8) are credited to manage wall thinning due to flow-accelerated corrosion for the feedring.

3.1.2.2.15 Changes in dimensions due to Void Swelling

Changes in dimensions due to void swelling for stainless steel reactor internals components exposed to reactor coolant will be managed by the plant-specific PWR Reactor Internals program (B2.1.35) based on the guidelines provided in EPRI 1016596 (MRP-227). Consistent with EPRI 1016596 (MRP-227), changes in dimension is not an applicable aging effect requiring management for the following components:

- RVI Control Rod Guide Tube Assembly
- RVI Control Rod Guide Tube Bolting
- RVI Control Rod Guide Tube Guide Plates
- RVI Core Barrel Assembly
- RVI Hold Down Spring
- RVI ICI Support Structures-Instrument Column (BMI)
- RVI ICI Support Structures-Upper/Lower Tie Plates
- RVI Lower Core Support Bolts
- RVI Lower Core Support-Clevis Insert Bolting
- RVI Lower Core Support-Core Support Plate Forging
- RVI Neutron Shield Panel
- RVI Radial Support Keys and Clevis Inserts
- RVI Upper Core Plate Guide Pins
- RVI Upper Core Support-Protective Skirt
- RVI Upper Core Support-Upper Core Plate
- RVI Upper Core Support-Upper Support Column
- RVI Upper Core Support-Upper Support Column Base
- RVI Upper Core Support-Upper Support Plate
- RVI Upper Support Column Bolting

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

3.1.2.2.16.1 Steam generator heads, tubesheets, and welds made or clad with stainless steel

The CRDM head penetrations, exit thermocouple penetration housing, internal disconnect device housing, and RVWLIS upper probe housing are made of stainless steel. For managing the aging effect of cracking due to stress corrosion cracking for stainless steel components exposed to reactor coolant, Water Chemistry program (B2.1.2) is augmented by ASME Section XI Inservice Inspection, Subsection IWB, IWC and IWD program (B2.1.1).

STP has recirculating steam generators, not once-through steam generators. Therefore, further evaluation 3.1.2.2.16.1 for the once-through steam generator components is not applicable to STP.

3.1.2.2.16.2 Pressurizer spray head cracking

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage cracking due to stress corrosion cracking and primary water stress corrosion cracking for stainless steel components exposed to reactor coolant. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

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

For managing the aging effect of cracking due to stress corrosion cracking, primary water stress corrosion cracking, and irradiation-assisted stress corrosion cracking of stainless steel reactor internals components exposed to reactor coolant, Water Chemistry program (B2.1.2) is augmented by the plant-specific PWR Reactor Internals program (B2.1.35) based on the guidelines provided in EPRI 1016596 (MRP-227). Consistent with EPRI 1016596 (MRP-227), cracking is not an applicable aging effect requiring management for the following components:

- RVI Lower Core Support-Clevis Insert Bolting
- RVI Radial Support Keys and Clevis Inserts
- RVI Upper Support Column Bolting

3.1.2.2.18 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.1.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components. The section of Chapter 4 that contains the TLAA review results is indicated in parenthesis.

- Cumulative Fatigue Damage (Section 4.3, Metal Fatigue Analysis)
- Loss of Fracture Toughness due to Neutron Embrittlement (Section 4.2, Reactor Vessel Neutron Embrittlement Analysis)

3.1.3 Conclusions

The Reactor Vessel, Internals and Reactor Coolant System component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the Reactor Vessel, Internals, and Reactor Coolant System component types are identified in the summary Tables and in Section 3.1.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the Reactor Vessel, Internals and Reactor Coolant System component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.01	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This is a Westinghouse vessel with no support skirt, so the applicable NUREG-1801 line was not used.
3.1.1.02					Not applicable - BWR only
3.1.1.03					Not applicable - BWR only
3.1.1.04					Not applicable - BWR only
3.1.1.05	Stainless steel and nickel alloy reactor vessel internals components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.1.2.2.1.
3.1.1.06	Nickel Alloy tubes and sleeves in a reactor coolant and secondary feedwater/steam environment	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.1.2.2.1.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

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

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.09	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy reactor vessel components: flanges; nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads and welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.1.2.2.1.
3.1.1.10	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy steam generator components (flanges; penetrations; nozzles; safe ends, lower heads and welds)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.1.2.2.1.
3.1.1.11					Not applicable - BWR only

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.12	Steel steam generator shell assembly exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.1.2.2.2.1.
3.1.1.13					Not applicable - BWR only
3.1.1.14					Not applicable - BWR only
3.1.1.15					Not applicable - BWR only
3.1.1.16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), and Water Chemistry (B2.1.2) and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.1.2.2.2.4.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.17	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR Part 50 and RG 1.99. The applicant may choose to demonstrate that the materials of the nozzles are not controlling for the TLAA evaluations.	Yes, TLAA	Fracture toughness due to neutron irradiation embrittlement is a TLAA. See further evaluation in Section 3.1.2.2.3.1.
3.1.1.18	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance (B2.1.15)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.1.2.2.3.2.
3.1.1.19					Not applicable - BWR only
3.1.1.20					Not applicable - BWR only
3.1.1.21	Reactor vessel shell fabricated of SA508-Cl 2 forgings clad with stainless steel using a high-heat-input welding process	Crack growth due to cyclic loading	TLAA	Yes, TLAA	Crack growth due to cyclic loading is a TLAA. See further evaluation in Section 3.1.2.2.5.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.22	Stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program PWR Reactor Internals (B2.1.35) is credited, with exception of the RVI neutron shield panel. See further evaluation in Section 3.1.2.2.6.
3.1.1.23	Stainless steel reactor vessel closure head flange leak detection line and bottom-mounted instrument guide tubes	Cracking due to stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) for BMI Guide Tube and Water Chemistry (B2.1.2) for BMI Flux Thimble. The STP reactor vessel flange leak detection line is made of nickel-alloy. See further evaluation in Section 3.1.2.2.7.1.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.24	Class 1 cast austenitic stainless steel piping, piping components, and piping elements exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2) and, for CASS components that do not meet the NUREG-0313 guidelines, a plant specific aging management program	Yes	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) is credited. See further evaluation in Section 3.1.2.2.7.2.
3.1.1.25					Not applicable - BWR only
3.1.1.26					Not applicable - BWR only
3.1.1.27	Stainless steel and nickel alloy reactor vessel internals screws, bolts, tie rods, and hold-down springs	Loss of preload due to stress relaxation	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program PWR Reactor Internals (B2.1.35) is credited, with exception of the RVI Lower Core Support-clevis insert bolting and RVI upper support column bolting. See further evaluation in Section 3.1.2.2.9.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.28	Steel steam generator feedwater impingement plate and support exposed to secondary feedwater	Loss of material due to erosion	A plant-specific aging management program is to be evaluated.	Yes	Not applicable. STP steam generators do not have feedwater impingement plates, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.1.2.2.10.
3.1.1.29					Not applicable - BWR only

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.30	Stainless steel reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Baffle/former assembly, Lower internal assembly, shroud assemblies, Plenum cover and plenum cylinder, Upper grid assembly, Control rod guide tube (CRGT) assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly, Thermal shield, Instrumentation support structures)	Cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry (B2.1.2) and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable for selected components. See further evaluation in Section 3.1.2.2.12.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.31	Nickel alloy and steel with nickel-alloy cladding piping, piping component, piping elements, penetrations, nozzles, safe ends, and welds (other than reactor vessel head); pressurizer heater sheaths, sleeves, diaphragm plate, manways and flanges; core support pads/core guide lugs	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1) and Water Chemistry (B2.1.2) and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No	Consistent with NUREG-1801 for material, environment, and aging effect, but different AMPs are credited: (I) For RV internal components, BMI Nozzles and Core Support Lugs made of Alloy 600, Nickel-Alloy Aging Management (B2.1.34), ISI (IWB, IWC, and IWD) (B2.1.1) for Class 1 components, Water Chemistry (B2.1.2) are credited. A commitment is made in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines. (II) For pressurizer and steam generator components made of Alloy 690, ISI (IWB, IWC, and IWD) (B2.1.1) for Class 1 components and Water Chemistry (B2.1.2) are credited. See further evaluation in Section 3.1.2.2.13.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.32	Steel steam generator feedwater inlet ring and supports	Wall thinning due to flow-accelerated corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2) See further evaluation in Section 3.1.2.2.14.
3.1.1.33	Stainless steel and nickel alloy reactor vessel internals components	Changes in dimensions due to void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable for selected components. See further evaluation in Section 3.1.2.2.15.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.34	Stainless steel and nickel alloy reactor control rod drive head penetration pressure housings	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1) and Water Chemistry (B2.1.2) and for nickel-alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No	Consistent with NUREG-1801. See further evaluation in Section 3.1.2.2.16.1.
3.1.1.35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1) and Water Chemistry (B2.1.2) and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No	Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.1.2.2.16.1.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) and, for nickel-alloy welded spray heads, comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No	Consistent with NUREG-1801. See further evaluation in Section 3.1.2.2.16.2.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.37	Stainless steel and nickel alloy reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Lower internal assembly, CEA shroud assemblies, Core shroud assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly)	Cracking due to stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry (B2.1.2) and FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable for selected components. See further evaluation in Section 3.1.2.2.17.
3.1.1.38					Not applicable - BWR only
3.1.1.39					Not applicable - BWR only
3.1.1.40					Not applicable - BWR only
3.1.1.41					Not applicable - BWR only
3.1.1.42					Not applicable - BWR only

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.43					Not applicable - BWR only
3.1.1.44					Not applicable - BWR only
3.1.1.45					Not applicable - BWR only
3.1.1.46					Not applicable - BWR only
3.1.1.47					Not applicable - BWR only
3.1.1.48					Not applicable - BWR only
3.1.1.49					Not applicable - BWR only
3.1.1.50					Not applicable - BWR only
3.1.1.51					Not applicable - BWR only

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.52	Steel and stainless steel reactor coolant pressure boundary (RCPB) pump and valve closure bolting, manway and holding bolting, flange bolting, and closure bolting in high-pressure and high-temperature systems	Cracking due to stress corrosion cracking, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.1.1.53	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10).
3.1.1.54	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope copper alloy piping, piping components or piping elements exposed to closed-cycle cooling water in the reactor coolant system, so the applicable NUREG-1801 line was not used.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.55	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection (IWB, IWC, and IWD) (B2.1.1). Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	Consistent with NUREG-1801.
3.1.1.56	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope copper alloy >15% Zn components exposed to closed- cycle cooling water in the reactor coolant system, so the applicable NUREG-1801 line was not used.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.57	Cast austenitic stainless steel Class 1 piping, piping component, and piping elements and control rod drive pressure housings exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	Portions of the STP reactor coolant loops are constructed of cast austenitic stainless steel. The straight piping pieces are centrifugally cast and the fittings are statically cast. The molybdenum and ferrite values for these fittings and piping pieces are below the industry accepted thermal aging significance threshold. Therefore, thermal aging of STP cast austenitic stainless steel reactor coolant piping is not a concern. The control rod drive pressure housings are made of stainless steel. Therefore, the applicable NUREG-1801 lines were not used.
3.1.1.58	Steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage	Loss of material due to boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.59	Steel steam generator steam nozzle and safe end, feedwater nozzle and safe end, AFW nozzles and safe ends exposed to secondary feedwater/steam	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion (B2.1.6)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Flow-Accelerated Corrosion (B2.1.6)
3.1.1.60	Stainless steel flux thimble tubes (with or without chrome plating)	Loss of material due to Wear	Flux Thimble Tube Inspection (B2.1.21)	No	Consistent with NUREG-1801.
3.1.1.61	Stainless steel, steel pressurizer integral support exposed to air with metal temperature up to 288°C (550°F)	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1)	No	Consistent with NUREG-1801.
3.1.1.62	Stainless steel, steel with stainless steel cladding reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.63	Steel reactor vessel flange, stainless steel and nickel alloy reactor vessel internals exposed to reactor coolant (e.g., upper and lower internals assembly, CEA shroud assembly, core support barrel, upper grid assembly, core support shield assembly, lower grid assembly)	Loss of material due to Wear	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1)	No	Consistent with NUREG-1801 except for aging management of the clevis insert bolting, control rod guide tube bolting, core barrel assembly, control rod guide tube guide plates and upper core plate guide pins, for which the material, environment, and aging effect are consistent with NUREG-1801 but a different aging management program PWR Reactor Internals (B2.1.35) is credited.
3.1.1.64	Stainless steel and steel with stainless steel or nickel alloy cladding pressurizer components	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.65	Nickel alloy reactor vessel upper head and control rod drive penetration nozzles, instrument tubes, head vent pipe (top head), and welds	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1) and Water Chemistry (B2.1.2) and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	No	Consistent with NUREG-1801.
3.1.1.66	Steel steam generator secondary manways and handholds (cover only) exposed to air with leaking secondary-side water and/or steam	Loss of material due to erosion	Inservice Inspection (IWB, IWC, and IWD) for Class 2 components (B2.1.1)	No	Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used.
3.1.1.67	Steel with stainless steel or nickel alloy cladding; or stainless steel pressurizer components exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.68	Stainless steel, steel with stainless steel cladding Class 1 piping, fittings, pump casings, valve bodies, nozzles, safe ends, manways, flanges, CRD housing; pressurizer heater sheaths, sleeves, diaphragm plate; pressurizer relief tank components, reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings	Cracking due to stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.69	Stainless steel, nickel alloy safety injection nozzles, safe ends, and associated welds and buttering exposed to reactor coolant	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 aging management program for stainless steel components in reactor coolant. For nickel-alloy components of reactor internals, different aging management programs, Nickel-Alloy Aging Management (B2.1.34), ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) for Class 1 components, Water Chemistry (B2.1.2), and Comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.70	Stainless steel; steel with stainless steel cladding Class 1 piping, fittings and branch connections < NPS 4 exposed to reactor coolant	Cracking due to stress corrosion cracking, thermal and mechanical loading	Inservice Inspection (IWB, IWC, and IWD) (B2.1.1), Water chemistry (B2.1.2), and One-Time Inspection of ASME Code Class 1 Small-bore Piping (B2.1.19)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.19)
3.1.1.71	High-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to wear	Reactor Head Closure Studs(B2.1.3)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Reactor Head Closure Studs (B2.1.3)
3.1.1.72	Nickel alloy steam generator tubes and sleeves exposed to secondary feedwater/ steam	Cracking due to OD stress corrosion cracking and intergranular attack, loss of material due to fretting and wear	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.
3.1.1.73	Nickel alloy steam generator tubes, repair sleeves, and tube plugs exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.74	Chrome plated steel, stainless steel, nickel alloy steam generator anti-vibration bars exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking, loss of material due to crevice corrosion and fretting	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.
3.1.1.75	Nickel alloy once-through steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of carbon steel tube support plate	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used.
3.1.1.76	Steel steam generator tube support plate, tube bundle wrapper exposed to secondary feedwater/steam	Loss of material due to erosion, general, pitting, and crevice corrosion, ligament cracking due to corrosion	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.
3.1.1.77	Nickel alloy steam generator tubes and sleeves exposed to phosphate chemistry in secondary feedwater/ steam	Loss of material due to wastage and pitting corrosion	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Not applicable. STP does not use phosphate chemistry. The STP steam generators use all volatile treatment, so the applicable NUREG-1801 line was not used.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.78	Steel steam generator tube support lattice bars exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Steam Generator Tube Integrity (B2.1.8) and Water Chemistry (B2.1.2)	No	Not applicable. STP steam generators do not contain lattice bars, so the applicable NUREG-1801 line was not used.
3.1.1.79	Nickel alloy steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of steel tube support plate	Steam Generator Tube Integrity (B2.1.8); Water Chemistry (B2.1.2) and, for plants that could experience denting at the upper support plates, evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02.	No	Not applicable. STP steam generators do not contain steel tube support plates and the aging effect of denting due to corrosion of steel tube support plate is not applicable.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.80	Cast austenitic stainless steel reactor vessel internals (e.g., upper internals assembly, lower internal assembly, CEA shroud assemblies, control rod guide tube assembly, core support shield assembly, lower grid assembly)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of CASS	No	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable based on EPRI 1016596 (MRP-227).
3.1.1.81	Nickel alloy or nickel-alloy clad steam generator divider plate exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801.
3.1.1.82	Stainless steel steam generator primary side divider plate exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2)	No	Not applicable. The primary side divider plates of STP steam generators are made of nickel alloy, so the applicable NUREG-1801 line was not used.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.83	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor vessel internals and reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 aging management program for pressurizer, reactor vessel and reactor vessel internals. For components in reactor coolant, CVCS and safety injection systems, different aging management programs, Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) are credited.
3.1.1.84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) or Inservice Inspection (IWB, IWC, and IWD) (B2.1.1).	No	Not applicable. STP has recirculating steam generators, not once-through steam generators, so the applicable NUREG-1801 line was not used.
3.1.1.85	Nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA	Consistent with NUREG-1801.

Table 3.1.1 Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for Reactor Vessel, Internals, and Reactor Coolant System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.86	Stainless steel piping, piping components, and piping elements exposed to air – indoor uncontrolled (External); air with borated water leakage; concrete; gas	None	None	NA	Consistent with NUREG-1801.
3.1.1.87	Steel piping, piping components, and piping elements in concrete	None	None	NA	Not applicable. The STP reactor vessel, internals, and reactor coolant systems have no in-scope steel piping, piping components or piping elements embedded in concrete, so the applicable NUREG-1801 line was not used.

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	High Strength Low Alloy Steel (Bolting)	Borated Water Leakage (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-4	3.1.1.07	A
CRDM Support	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A
Refueling Missile Shield	MB	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A
RV BMI Flux Thimble	PB	Stainless Steel	Borated Water Leakage (Int)	None	None	IV.E-3	3.1.1.86	C
RV BMI Flux Thimble	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2)	IV.A2-1	3.1.1.23	E
RV BMI Flux Thimble	PB	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Flux Thimble Tube Inspection (B2.1.21)	IV.B2-13	3.1.1.60	A
RV BMI Flux Thimble	PB	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RV BMI Guide Tube	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV BMI Guide Tube	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.A2-1	3.1.1.23	E
RV BMI Guide Tube	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV BMI Nozzle and Welds	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV BMI Nozzle and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV BMI Nozzle and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	Nickel-Alloy Aging Management (B2.1.37), ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) for Class 1 components, Water Chemistry (B2.1.2), and Comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	IV.A2-19	3.1.1.31	E, 1
RV BMI Nozzle and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Closure Head	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Closure Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Closure Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.A2-15	3.1.1.69	A
RV Closure Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Closure Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-25	3.1.1.63	A
RV Closure Head Bolts	PB	High Strength Low Alloy Steel (Bolting)	Borated Water Leakage (Ext)	Cracking	Reactor Head Closure Studs (B2.1.3)	IV.A2-2	3.1.1.71	B

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Closure Head Bolts	PB	High Strength Low Alloy Steel (Bolting)	Borated Water Leakage (Ext)	Loss of material	Reactor Head Closure Studs (B2.1.3)	IV.A2-3	3.1.1.71	B
RV Closure Head Bolts	PB	High Strength Low Alloy Steel (Bolting)	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Core Support Lugs	SS	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Nickel-Alloy Aging Management (B2.1.37), ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) for Class 1 components, Water Chemistry (B2.1.2), and Comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	IV.A2-12	3.1.1.31	E, 1
RV Core Support Lugs	SS	Nickel Alloys	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	C
RV CRDM Head Penetrations (Flange and Plug)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV CRDM Head Penetrations (Flange and Plug)	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	C
RV CRDM Head Penetrations (Flange and Plug)	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV CRDM Head Penetrations (Nozzle and Welds)	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV CRDM Head Penetrations (Nozzle and Welds)	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1), Water Chemistry (B2.1.2), and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)	IV.A2-9	3.1.1.65	A
RV CRDM Head Penetrations (Nozzle and Welds)	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV CRDM Head Penetrations (Thermal Sleeve)	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	A
RV CRDM Head Penetrations (Thermal Sleeve)	PB	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV CRDM Housing	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
RV CRDM Housing	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	A
RV CRDM Housing	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV CRDM Housing	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Exit Thermocouple Penetration Housing	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
RV Exit Thermocouple Penetration Housing	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	C
RV Exit Thermocouple Penetration Housing	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Exit Thermocouple Penetrations	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV Exit Thermocouple Penetrations	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Exit Thermocouple Penetrations	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1), Water Chemistry (B2.1.2), and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)	IV.A2-18	3.1.1.65	A
RV Flange Leak Monitoring Tube	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV Flange Leak Monitoring Tube	PB	Nickel Alloys	Borated Water Leakage (Int)	None	None	None	None	G, 2
RV Head Vent Nozzle, Pipe and Welds	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV Head Vent Nozzle, Pipe and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Head Vent Nozzle, Pipe and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1), Water Chemistry (B2.1.2), and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)	IV.A2-18	3.1.1.65	A
RV Head Vent Nozzle, Pipe and Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Inlet and Outlet Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A
RV Inlet and Outlet Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Inlet and Outlet Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of fracture toughness	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-16	3.1.1.17	A
RV Inlet and Outlet Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of fracture toughness	Reactor Vessel Surveillance (B2.1.15)	IV.A2-17	3.1.1.18	A
RV Inlet and Outlet Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Internal Disconnect Device Housing	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
RV Internal Disconnect Device Housing	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	C
RV Internal Disconnect Device Housing	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Internal Disconnect Device Penetration	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV Internal Disconnect Device Penetration	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1), Water Chemistry (B2.1.2), and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)	IV.A2-9	3.1.1.65	C
RV Internal Disconnect Device Penetration	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Nozzle Safe End Welds	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV Nozzle Safe End Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Nozzle Safe End Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	Nickel-Alloy Aging Management (B2.1.37), ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) for Class 1 components, Water Chemistry (B2.1.2), and Comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	IV.A2-15	3.1.1.69	E, 1
RV Nozzle Safe End Welds	PB	Nickel Alloys	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Nozzle Safe Ends	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
RV Nozzle Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Nozzle Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.A2-15	3.1.1.69	A
RV Nozzle Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Nozzle Support Pads	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A
RV RVWLIS Penetration	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 2
RV RVWLIS Penetration	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV RVWLIS Penetration	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1), Water Chemistry (B2.1.2), and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (B2.1.5)	IV.A2-18	3.1.1.65	A
RV RVWLIS Upper Probe Housing	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
RV RVWLIS Upper Probe Housing	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-11	3.1.1.34	A
RV RVWLIS Upper Probe Housing	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Shell Bottom Head	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Shell Bottom Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Shell Bottom Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.A2-15	3.1.1.69	C
RV Shell Bottom Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Shell Bottom Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of fracture toughness	Reactor Vessel Surveillance (B2.1.15)	IV.A2-24	3.1.1.18	A
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.A2-13	3.1.1.58	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.A2-14	3.1.1.83	A
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.A2-15	3.1.1.69	C
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-21	3.1.1.09	A
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of fracture toughness	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.A2-23	3.1.1.17	A
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of fracture toughness	Reactor Vessel Surveillance (B2.1.15)	IV.A2-24	3.1.1.18	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RV Upper, Intermediate, Lower Shell and Welds	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.A2-25	3.1.1.63	A
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Changes in dimensions	PWR Reactor Internals (B2.1.35)	IV.B2-4	3.1.1.33	E, 3
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of preload	PWR Reactor Internals (B2.1.35)	IV.B2-5	3.1.1.27	E, 3
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-6	3.1.1.22	E, 3
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-10	3.1.1.30	E, 3
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Baffle-Edge Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Baffle-Former Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Changes in dimensions	PWR Reactor Internals (B2.1.35)	IV.B2-1	3.1.1.33	E, 3

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Baffle-Former Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-2	3.1.1.30	E
RVI Baffle-Former Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-3	3.1.1.22	E, 3
RVI Baffle-Former Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Changes in dimensions	PWR Reactor Internals (B2.1.35)	IV.B2-4	3.1.1.33	E, 3
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of preload	PWR Reactor Internals (B2.1.35)	IV.B2-5	3.1.1.27	E, 3
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-6	3.1.1.22	E, 3
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-10	3.1.1.30	E, 3
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Baffle-Former Assembly Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Control Rod Guide Tube Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-9	3.1.1.22	E, 3
RVI Control Rod Guide Tube Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-29	3.1.1.33	I, 4
RVI Control Rod Guide Tube Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-30	3.1.1.30	E, 3
RVI Control Rod Guide Tube Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Control Rod Guide Tube Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-27	3.1.1.33	I, 4
RVI Control Rod Guide Tube Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2)and PWR Reactor Internals (B2.1.35)	IV.B2-28	3.1.1.37	E, 3
RVI Control Rod Guide Tube Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Control Rod Guide Tube Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	PWR Reactor Internals (B2.1.35)	IV.B2-34	3.1.1.63	E, 3
RVI Control Rod Guide Tube Guide Plates	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-29	3.1.1.33	I, 4

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Control Rod Guide Tube Guide Plates	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Control Rod Guide Tube Guide Plates	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	PWR Reactor Internals (B2.1.35)	IV.B2-34	3.1.1.63	E, 3
RVI Core Barrel Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-7	3.1.1.33	I, 4
RVI Core Barrel Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-8	3.1.1.30	E, 3
RVI Core Barrel Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-9	3.1.1.22	E, 3
RVI Core Barrel Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Core Barrel Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Core Barrel Assembly	DF, SLD, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	PWR Reactor Internals (B2.1.35)	IV.B2-34	3.1.1.63	E, 3
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Changes in dimensions	PWR Reactor Internals (B2.1.35)	IV.B2-4	3.1.1.33	E, 3

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of preload	PWR Reactor Internals (B2.1.35)	IV.B2-5	3.1.1.27	E, 3
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-6	3.1.1.22	E, 3
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2)and PWR Reactor Internals (B2.1.35)	IV.B2-10	3.1.1.30	E, 3
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Core Barrel Assembly-Former Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Hold Down Spring	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Hold Down Spring	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of preload	PWR Reactor Internals (B2.1.35)	IV.B2-33	3.1.1.27	E, 3
RVI Hold Down Spring	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-41	3.1.1.33	I, 4
RVI Hold Down Spring	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-42	3.1.1.30	I, 5

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI ICI Support Structures (Exit Thermocouple)	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI ICI Support Structures-Instr Column (BMI)	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-11	3.1.1.33	I, 4
RVI ICI Support Structures-Instr Column (BMI)	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-12	3.1.1.30	E, 3
RVI ICI Support Structures-Instr Column (BMI)	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI ICI Support Structures-Upper/Lower Tie Plates	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-22	3.1.1.22	E, 3
RVI ICI Support Structures-Upper/Lower Tie Plates	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-23	3.1.1.33	I, 4
RVI ICI Support Structures-Upper/Lower Tie Plates	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-24	3.1.1.30	E, 3

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI ICI Support Structures-Upper/Lower Tie Plates	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Irradiation Specimen Basket	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-15	3.1.1.33	I, 4
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-16	3.1.1.37	E, 3
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-17	3.1.1.22	E, 3
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of preload	PWR Reactor Internals (B2.1.35)	IV.B2-25	3.1.1.27	E, 3
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Lower Core Support Bolts	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Lower Core Support-Clevis Insert Bolting	SS	Nickel Alloys	Reactor Coolant (Ext)	None	None	IV.B2-14	3.1.1.27	I, 6

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Lower Core Support-Clevis Insert Bolting	SS	Nickel Alloys	Reactor Coolant (Ext)	None	None	IV.B2-15	3.1.1.33	I, 4
RVI Lower Core Support-Clevis Insert Bolting	SS	Nickel Alloys	Reactor Coolant (Ext)	None	None	IV.B2-16	3.1.1.37	I, 7
RVI Lower Core Support-Clevis Insert Bolting	SS	Nickel Alloys	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Lower Core Support-Clevis Insert Bolting	SS	Nickel Alloys	Reactor Coolant (Ext)	Loss of material	PWR Reactor Internals (B2.1.35)	IV.B2-34	3.1.1.63	E, 3
RVI Lower Core Support-Core Support Plate Forging	DF, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of fracture toughness	PWR Reactor Internals (B2.1.35)	IV.B2-22	3.1.1.22	E, 3
RVI Lower Core Support-Core Support Plate Forging	DF, SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-23	3.1.1.33	I, 4
RVI Lower Core Support-Core Support Plate Forging	DF, SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-24	3.1.1.30	E, 3

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Lower Core Support-Core Support Plate Forging	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Lower Core Support-Core Support Plate Forging	DF, SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Lower Core Support-Energy Absorber Assembly	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Neutron Shield Panel	SLD	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-7	3.1.1.33	I, 4
RVI Neutron Shield Panel	SLD	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-8	3.1.1.30	I, 5
RVI Neutron Shield Panel	SLD	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-9	3.1.1.22	I, 8
RVI Neutron Shield Panel	SLD	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Radial Support Keys and Clevis Inserts	SS	Nickel Alloys	Reactor Coolant (Ext)	None	None	IV.B2-19	3.1.1.33	I, 4
RVI Radial Support Keys and Clevis Inserts	SS	Nickel Alloys	Reactor Coolant (Ext)	None	None	IV.B2-20	3.1.1.37	I, 7

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Radial Support Keys and Clevis Inserts	SS	Nickel Alloys	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Core Plate Guide Pins	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Core Plate Guide Pins	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	PWR Reactor Internals (B2.1.35)	IV.B2-34	3.1.1.63	E, 3
RVI Upper Core Plate Guide Pins	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-39	3.1.1.33	I, 4
RVI Upper Core Plate Guide Pins	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-40	3.1.1.37	E, 3
RVI Upper Core Support-Protective Skirt	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Upper Core Support-Protective Skirt	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Core Support-Protective Skirt	SS	Stainless Steel	Reactor Coolant (Ext)	None	PWR Reactor Internals (B2.1.35)	IV.B2-41	3.1.1.33	I, 4

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Upper Core Support-Protective Skirt	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-42	3.1.1.30	E, 3
RVI Upper Core Support-Upper Core Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Upper Core Support-Upper Core Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Core Support-Upper Core Plate	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-41	3.1.1.33	I, 4
RVI Upper Core Support-Upper Core Plate	SS	Stainless Steel	Reactor Coolant (Ext)	None	Water Chemistry (B2.1.2) and PWR Reactor Internals (B2.1.35)	IV.B2-42	3.1.1.30	I, 5
RVI Upper Core Support-Upper Support Column	SS	Stainless Steel	Reactor Coolant (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.B2-31	3.1.1.05	A
RVI Upper Core Support-Upper Support Column	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Upper Core Support-Upper Support Column	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-35	3.1.1.33	I, 4
RVI Upper Core Support-Upper Support Column	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-36	3.1.1.30	I, 5
RVI Upper Core Support-Upper Support Column Base	SS	Stainless Steel Cast Austenitic	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Core Support-Upper Support Column Base	SS	Stainless Steel Cast Austenitic	Reactor Coolant (Ext)	None	None	IV.B2-35	3.1.1.33	I, 4
RVI Upper Core Support-Upper Support Column Base	SS	Stainless Steel Cast Austenitic	Reactor Coolant (Ext)	None	None	IV.B2-36	3.1.1.30	I, 5
RVI Upper Core Support-Upper Support Column Base	SS	Stainless Steel Cast Austenitic	Reactor Coolant (Ext)	None	None	IV.B2-37	3.1.1.80	I, 9
RVI Upper Core Support-Upper Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A

Table 3.1.2-1 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Vessel and Internals (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
RVI Upper Core Support-Upper Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-41	3.1.1.33	I, 4
RVI Upper Core Support-Upper Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-42	3.1.1.30	I, 5
RVI Upper Support Column Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.B2-32	3.1.1.83	A
RVI Upper Support Column Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-38	3.1.1.27	I, 6
RVI Upper Support Column Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-39	3.1.1.33	I, 4
RVI Upper Support Column Bolting	SS	Stainless Steel	Reactor Coolant (Ext)	None	None	IV.B2-40	3.1.1.37	I, 7
Seal Table	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

<u>Notes for Table 3.1.2-1:</u>

<u>Standard Notes:</u>

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
G Environment not in NUREG-1801 for this component and material.
I Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.

<u>Plant Specific Notes:</u>
1 Includes the plant specific Nickel-Alloy Aging Management Program (B2.1.37) in addition to the programs identified in NUREG-1801.
2 NUREG-1801 does not address the aging effect of nickel-alloys in borated water leakage. Nickel-alloys subject to an air with borated water leakage environment are similar to stainless steel in a borated water leakage environment and do not experience aging effects due to borated water leakage.
3 Plant-specific aging management program PWR Reactor Internals (B2.1.35), is credited to manage this aging effect.
4 See Further Evaluation in Section 3.1.2.2.15.
5 See Further Evaluation in Section 3.1.2.2.12.
6 See Further Evaluation in Section 3.1.2.2.9.
7 See Further Evaluation in Section 3.1.2.2.17.
8 See Further Evaluation in Section 3.1.2.2.6.
9 Consistent with EPRI 1016596 (MRP-227), loss of fracture toughness is not an applicable aging effect requiring management for the upper support column base.

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Class 1 Piping <= 4in	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Class 1 Piping <= 4in	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2) and One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.19)	IV.C2-1	3.1.1.70	B
Class 1 Piping <= 4in	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2
Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-10	3.1.1.07	A
Closure Bolting	PB	Stainless Steel	Borated Water Leakage (Ext)	Cracking	Bolting Integrity (B2.1.7)	IV.C2-7	3.1.1.52	B
Closure Bolting	PB	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	PB	Stainless Steel	Borated Water Leakage (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-10	3.1.1.07	A
Flow Element	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Indicator	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Indicator	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Indicator	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Stainless Steel	Plant Indoor Air (Ext)	None	None	IV.E-2	3.1.1.86	C
Piping	LBS	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-26	3.3.1.15	B
Piping	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-26	3.3.1.15	B, 3
Piping	SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-26	3.3.1.15	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.C-1	3.2.1.31	B
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.C-4	3.2.1.03	A
Piping	PB, SIA	Stainless Steel	Dry Gas (Int)	None	None	IV.E-5	3.1.1.86	A
Piping	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-18	3.3.1.33	B, 3
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	IV.E-2	3.1.1.86	A
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.D1-29	3.2.1.08	E
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.C2-26	3.1.1.62	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-27	3.1.1.68	A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Piping	LBS, PB, SIA	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.C2-3	3.1.1.24	E, 1
Piping	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
Piping	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Piping	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Piping	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Pump	PB	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-5	3.1.1.68	A
Pump	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Loss of fracture toughness	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.C2-6	3.1.1.55	A
Pump	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
Pump	PB	Stainless Steel Cast Austenitic	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Rupture Disc	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Rupture Disc	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Rupture Disc	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-22	3.3.1.14	D
Tank	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-27	3.3.1.16	B, 3
Tank	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.C-1	3.2.1.31	B
Tank	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	C
Tank	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Tank	LBS	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-22	3.3.1.14	B
Valve	SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-26	3.3.1.15	B
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-26	3.3.1.15	B, 3
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.C-1	3.2.1.31	B
Valve	PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
Valve	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.C-4	3.2.1.03	A
Valve	PB, SIA	Stainless Steel	Dry Gas (Int)	None	None	IV.E-5	3.1.1.86	A

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-18	3.3.1.33	B
Valve	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-18	3.3.1.33	B, 3
Valve	SIA	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-18	3.3.1.33	B
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	IV.E-2	3.1.1.86	A
Valve	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.D1-29	3.2.1.08	E
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-5	3.1.1.68	A
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2

Table 3.1.2-2 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Reactor Coolant System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2

<u>Notes for Table 3.1.2-2:</u>

<u>Standard Notes:</u>

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

<u>Plant Specific Notes:</u>

1	Water Chemistry (B2.1.2) and ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1) are used to manage this aging effect for Cast Austenitic Stainless Steel (CASS) components.
2	The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.
3	Component is part of RCP oil collection system.

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A
PZR Heater Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Heater Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A
PZR Heater Support Plate	SS	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-20	3.1.1.68	A
PZR Heater Well Nozzle	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-20	3.1.1.68	A
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-20	3.1.1.68	A
PZR Heater Well Nozzle	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Instrument Penetrations	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
PZR Instrument Penetrations	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Instrument Penetrations	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Instrument Penetrations	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-19	3.1.1.64	A
PZR Instrument Penetrations	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Manways and Covers	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A
PZR Manways and Covers	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Manways and Covers	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Manways and Covers	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A
PZR Manways and Covers	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Nozzle Thermal Sleeve	SH	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Nozzle Thermal Sleeve	SH	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-19	3.1.1.64	A
PZR Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A
PZR Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
PZR Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A
PZR Nozzles	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Nozzles	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Safe Ends	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G
PZR Safe Ends	PB	Nickel Alloys	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Safe Ends	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-24	3.1.1.31	E, 1

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Safe Ends	PB	Nickel Alloys	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Safe Ends	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
PZR Safe Ends	PB	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Safe Ends	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A
PZR Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Seismic Lug	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Seismic Lug	SS	Carbon Steel	Borated Water Leakage (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-10	3.1.1.07	A
PZR Seismic Lug	SS	Carbon Steel	Borated Water Leakage (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.C2-16	3.1.1.61	A
PZR Shell and Head	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A
PZR Shell and Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Shell and Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-18	3.1.1.67	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Shell and Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-19	3.1.1.64	A
PZR Shell and Head	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
PZR Spray Head	SP	Stainless Steel	Reactor Coolant (Ext)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Spray Head	SP	Stainless Steel	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-17	3.1.1.36	A
PZR Spray Head	SP	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2)	IV.C2-15	3.1.1.83	A
PZR Spray Head	SP	Stainless Steel	Reactor Coolant (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-17	3.1.1.36	A
PZR Support Skirt	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.C2-09	3.1.1.58	A

Table 3.1.2-3 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Pressurizer (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
PZR Support Skirt	SS	Carbon Steel	Borated Water Leakage (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-10	3.1.1.07	A
PZR Support Skirt	SS	Carbon Steel	Borated Water Leakage (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.C2-16	3.1.1.61	A

Notes for Table 3.1.2-3:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

1 The inspection requirements of ASME Code Case N-722 do not apply to components with pressure retaining welds fabricated with Alloy 600/82/182 that have been mitigated by weld overlay.

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Closure Bolting	PB	Carbon Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.D1-10	3.1.1.52	B
SG Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	V.E-4	3.2.1.23	B
SG Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	V.E-5	3.2.1.24	B
SG Feedwater Ring and AFW Spray Pipe	DF	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C
SG Feedwater Ring and AFW Spray Pipe	DF	Carbon Steel	Secondary Water (Ext)	Wall thinning	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-26	3.1.1.32	E
SG Feedwater Ring and AFW Spray Pipe	DF	Carbon Steel	Secondary Water (Int)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C
SG Feedwater Ring and AFW Spray Pipe	DF	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Feedwater Ring and AFW Spray Pipe	DF	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Feedwater Ring and AFW Spray Pipe	DF	Nickel Alloys	Secondary Water (Int)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C
SG Feedwater Ring and AFW Spray Pipe	DF	Nickel Alloys	Secondary Water (Int)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Flow Distribution Baffle	SS	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C
SG Flow Distribution Baffle	SS	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Flow Distribution Baffle	DF, PB	Stainless Steel	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Flow Distribution Baffle	DF, PB	Stainless Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Internal Structures	SS	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C
SG Internal Structures	DF	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	A
SG Internal Structures	DF	Stainless Steel	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C
SG Internal Structures	SS	Stainless Steel	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	A
SG Internal Structures	SS	Stainless Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	A

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Internal Structures	DF	Stainless Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Moisture Separators	DF, SS	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C
SG Moisture Separators	DF, SS	Carbon Steel	Secondary Water (Ext)	Wall thinning	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-26	3.1.1.32	E
SG Primary Head and Divider Plate	PB	Carbon Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-9	3.1.1.76	C
SG Primary Head and Divider Plate	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Primary Head and Divider Plate	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A
SG Primary Head and Divider Plate	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-8	3.1.1.10	A
SG Primary Head and Divider Plate	PB	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Water Chemistry (B2.1.2)	IV.D1-6	3.1.1.81	A, 2
SG Primary Manway Covers	PB, SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Primary Manway Covers	PB	Stainless Steel	Reactor Coolant (Ext)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Primary Nozzles and Safe Ends	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	IV.D1-3	3.1.1.58	A
SG Primary Nozzles and Safe Ends	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A
SG Primary Nozzles and Safe Ends	PB	Carbon Steel with Stainless Steel Cladding	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-8	3.1.1.10	A
SG Primary Nozzles and Safe Ends	PB	Nickel Alloys	Borated Water Leakage (Ext)	None	None	None	None	G
SG Primary Nozzles and Safe Ends	PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)	IV.D1-4	3.1.1.31	E, 1

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Primary Nozzles and Safe Ends	PB	Nickel Alloys	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-8	3.1.1.10	A
SG Primary Nozzles and Safe Ends	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	IV.E-3	3.1.1.86	A
SG Primary Nozzles and Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-1	3.1.1.68	A
SG Primary Nozzles and Safe Ends	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-8	3.1.1.10	A
SG Secondary Nozzles and Safe Ends	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
SG Secondary Nozzles and Safe Ends	PB	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	IV.D1-5	3.1.1.59	B

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Secondary Nozzles and Safe Ends	PB	Carbon Steel	Secondary Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-11	3.1.1.07	A
SG Secondary Nozzles and Safe Ends	PB	Carbon Steel	Secondary Water (Int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 2 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-12	3.1.1.16	A
SG Secondary Nozzles and Safe Ends	TH	Nickel Alloys	Plant Indoor Air (Ext)	None	None	IV.E-1	3.1.1.85	A
SG Secondary Nozzles and Safe Ends	DF, SH	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	A
SG Secondary Nozzles and Safe Ends	DF, SH	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	A
SG Secondary Nozzles and Safe Ends	TH	Nickel Alloys	Secondary Water (Int)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Secondary Nozzles and Safe Ends	TH	Nickel Alloys	Secondary Water (Int)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Secondary Shell	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
SG Secondary Shell	PB	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	IV.D1-5	3.1.1.59	B
SG Secondary Shell	PB	Carbon Steel	Secondary Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.D1-11	3.1.1.07	A
SG Secondary Shell	PB	Carbon Steel	Secondary Water (Int)	Loss of material	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 2 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.D1-12	3.1.1.16	A
SG Secondary Side Access Covers	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Secondary Side Access Covers	PB	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C
SG Secondary Side Access Covers	PB	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Tube Plugs	PB	Nickel Alloys	Reactor Coolant (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-18	3.1.1.73	A
SG Tube Support Plates	SS	Stainless Steel	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-14	3.1.1.74	C
SG Tube Support Plates	SS	Stainless Steel	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-15	3.1.1.74	C
SG Tubes	HT, PB	Nickel Alloys	Reactor Coolant (Int)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-20	3.1.1.73	A

Table 3.1.2-4 Reactor Vessel, Internals, and Reactor Coolant System – Summary of Aging Management Evaluation – Steam Generators (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
SG Tubes	HT, PB	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-22	3.1.1.72	A
SG Tubes	HT, PB	Nickel Alloys	Secondary Water (Ext)	Cracking	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-23	3.1.1.72	A
SG Tubes	HT, PB	Nickel Alloys	Secondary Water (Ext)	Loss of material	Steam Generator Tubing Integrity (B2.1.8) and Water Chemistry (B2.1.2)	IV.D1-24	3.1.1.72	A

Notes for Table 3.1.2-4:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 The inspection requirements of ASME Code Case N-722 do not apply to components with pressure retaining welds fabricated with Alloy 600/82/182 that have been mitigated by weld overlay.

2 The divider plates in the replacement steam generators installed at STP are made of Alloy 690.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES

3.2.1 Introduction

Section 3.2 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.3.2, Engineered Safety Features, subject to AMR. These systems are described in the following sections:

- Containment spray system (Section 2.3.2.1)
- Integrated leak rate test system (Section 2.3.2.2)
- Residual heat removal system (Section 2.3.2.3)
- Safety injection system (Section 2.3.2.4)

Table 3.2.1, Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features, provides the summary of the programs evaluated in NUREG-1801 that are applicable to the component types in this section. Table 3.2.1 uses the format of Table 1 described in Section 3.0.

3.2.2 Results

The following tables summarize the results of the AMR for the systems in the Engineered Safety Features area:

- Table 3.2.2-1, Engineered Safety Features – Summary of Aging Management Evaluation – Containment Spray System
- Table 3.2.2-2, Engineered Safety Features – Summary of Aging Management Evaluation – Integrated Leak Rate Test System
- Table 3.2.2-3, Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System
- Table 3.2.2-4, Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System

These tables use the format of Table 2 discussed in Section 3.0.

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

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.2.2.1.1 Containment Spray System

Materials

The materials of construction for the containment spray system component types are:

- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The containment spray system component types are exposed to the following environments:

- Borated Water Leakage
- Plant Indoor Air
- Treated Borated Water

Aging Effects Requiring Management

The following containment spray system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the containment spray system component types:

- Bolting Integrity (B2.1.7)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.2.2.1.2 Integrated Leak Rate Test System

Materials

The materials of construction for the integrated leak rate test system component types are:

- Carbon Steel

Environment

The integrated leak rate test system components are exposed to the following environments:

- Plant Indoor Air

Aging Effects Requiring Management

The following integrated leak rate test system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the integrated leak rate test system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)

3.2.2.1.3 Residual Heat Removal System

Materials

The materials of construction for the residual heat removal system component types is:

- Carbon Steel
- Insulation Fiberglass
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The residual heat removal system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water

- Plant Indoor Air
- Reactor Coolant
- Treated Borated Water

Aging Effects Requiring Management

The following residual heat removal system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the residual heat removal system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.2.2.1.4 Safety Injection System

Materials

The materials of construction for the safety injection system component types are:

- Carbon Steel
- Carbon Steel with Stainless Steel Cladding
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The safety injection system components are exposed to the following environments:

- Borated Water Leakage
- Dry Gas
- Plant Indoor Air
- Reactor Coolant
- Treated Borated Water

Aging Effects Requiring Management

The following safety injection system aging effects require management:

- Cracking
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the safety injection system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces In Miscellaneous Piping And Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation. For the engineered safety features, those evaluations are addressed in the following subsections.

3.2.2.2.1 Cumulative Fatigue Damage

Cumulative fatigue damage of ESF piping is a TLAA as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1).

STP piping outside the reactor coolant pressure boundary is designed to ASME III Class 2, Class 3, and ANSI B31.1, all of which require a reduction in the allowable secondary stress range if more than 7000 full-range thermal cycles are expected in a design lifetime. Section 4.3.5 describes the evaluation of these cyclic design TLAAs.

A survey of other than ASME III Class 1 pressure-retaining components discovered no valves or other piping components designed with fatigue analyses, or designed for a finite number of load cycles other than the piping described above.

3.2.2.2.2 Loss of Material due to Cladding Breach

Not applicable. STP has no in-scope steel with stainless steel cladding pump casing exposed to treated borated water in the emergency core cooling system, so the applicable NUREG-1801 line was not used.

3.2.2.2.3 Loss of Material due to Pitting and Crevice Corrosion

3.2.2.2.3.1 Internal surfaces of stainless steel containment isolation piping and components exposed to treated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages loss of material due to pitting and crevice corrosion for stainless steel components exposed to demineralized water. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.2.2.2.3.2 Stainless steel piping and components exposed to soil

Not applicable. STP has no in-scope stainless steel piping, piping components, and piping elements exposed to soil in the emergency core cooling system, so the applicable NUREG-1801 line was not used.

3.2.2.2.3.3 BWR stainless steel and aluminum piping and components exposed to treated water

Not applicable to STP, applicable to BWR only.

3.2.2.2.3.4 Stainless steel and copper piping and components exposed to lubricating oil

Not applicable. STP has no in-scope stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil in the emergency core cooling system, so the applicable NUREG-1801 lines were not used.

3.2.2.2.3.5 Partially encased stainless steel tanks exposed to raw water

Not applicable. STP has no stainless steel tanks with a moisture barrier configuration exposed to raw water in the emergency core cooling system, so the applicable NUREG-1801 line was not used.

3.2.2.2.3.6 Stainless steel piping, components, and tanks exposed to internal condensation

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages loss of material from pitting and crevice corrosion for stainless steel internal surfaces exposed to condensation environment.

3.2.2.2.4 Reduction of Heat Transfer due to Fouling

3.2.2.2.4.1 Stainless steel and copper heat exchanger tubes exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manages loss of heat transfer due to fouling for copper alloy components exposed to lubricating oil. The one-time inspection includes selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.2.2.2.4.2 Stainless steel heat exchanger tubes exposed to treated water

Not applicable. STP has no in-scope stainless steel heat exchanger tubes exposed to treated water in the containment spray system, so the applicable NUREG-1801 line was not used.

3.2.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

Not applicable to STP, applicable to BWR only.

3.2.2.2.6 Loss of Material due to Erosion

Not applicable. STP does not use the safety injection pumps for normal charging, so the applicable NUREG-1801 line was not used.

3.2.2.2.7 Loss of Material due to General Corrosion and Fouling

Not applicable to STP, applicable to BWR only.

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

3.2.2.2.8.1 BWR piping and components exposed to treated water

Not applicable to STP, applicable to BWR only.

3.2.2.2.8.2 Internal surfaces of steel containment isolation piping and components exposed to treated water

Not applicable. The containment isolation components were evaluated in the systems in which the components were found to have the function of containment integrity, so the applicable NUREG-1801 line was not used.

3.2.2.2.8.3 Steel piping and components exposed to lubricating oil

Not applicable. STP has no in-scope carbon steel components exposed to lubricating oil in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.

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

Not applicable to STP, applicable to BWR only.

3.2.2.2.10 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.2.2.3 Time-Limited Aging Analysis

The Time-Limited Aging Analyses identified below are associated with the engineered safety features component types. The section of Chapter 4 that contains the TLAA review results is indicated in parenthesis.

- Cumulative Fatigue Damage (Section 4.3, Metal Fatigue Analysis)

3.2.3 Conclusions

The engineered safety features component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the engineered safety features component types are identified in the summary Tables and in Section 3.2.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the engineered safety features component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

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

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.01	Steel and stainless steel piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.2.2.2.1.
3.2.1.02	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material due to cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, *Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks*	Yes	Not applicable. STP has no in-scope steel with stainless steel cladding pump casing exposed to treated borated water in the emergency core cooling system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.2.
3.2.1.03	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.2.2.2.3.1.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.04	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Not applicable. STP has no in-scope stainless steel piping, piping components, and piping elements exposed to soil in the emergency core cooling system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.3.2.
3.2.1.05					Not applicable - BWR only
3.2.1.06	Stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in-scope stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil in the emergency core cooling system, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.2.2.2.3.4.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.07	Partially encased stainless steel tanks with breached moisture barrier exposed to raw water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottoms because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes	Not applicable. STP has no stainless steel tanks with a moisture barrier configuration exposed to raw water in the emergency core cooling system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.3.5.
3.2.1.08	Stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). See further evaluation in Section 3.2.2.2.3.6.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.09	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.2.2.2.4.1.
3.2.1.10	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in-scope stainless steel heat exchanger tubes exposed to treated water in the containment spray system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.4.2.
3.2.1.11					Not applicable - BWR only

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.12	Stainless steel high-pressure safety injection (charging) pump miniflow orifice exposed to treated borated water	Loss of material due to erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging.	Yes	Not applicable. STP does not use the safety injection pumps for normal charging, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.6.
3.2.1.13					Not applicable - BWR only
3.2.1.14					Not applicable - BWR only
3.2.1.15	Steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Not applicable. The containment isolation components were evaluated in the systems in which the components were found to have the function of containment integrity, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.2.2.2.8.2.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.16	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in-scope carbon steel components exposed to lubricating oil in the engineered safety features systems, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.2.2.2.8.3.
3.2.1.17					Not applicable - BWR only
3.2.1.18					Not applicable - BWR only
3.2.1.19					Not applicable - BWR only
3.2.1.20					Not applicable - BWR only
3.2.1.21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity (B2.1.7)	No	Not applicable. STP has no in-scope high-strength steel closure bolting in the engineered safety features systems, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.22	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity (B2.1.7)	No	Not applicable. STP uses plant indoor air environment to evaluate closure bolting. STP used the NUREG-1801 line 3.2.1-23 to evaluate steel closure bolting exposed to an air-indoor uncontrolled environment instead of the NUREG-1801 line 3.2.1.22. NUREG-1800 lines 3.2.1-22 and 3.2.1-23 both manage loss of material using Bolting Integrity (B2.1.7).
3.2.1.23	Steel bolting and closure bolting exposed to air – outdoor (external), or air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.24	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.2.1.25	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.2.1.26	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope steel piping, piping components, and piping elements exposed to closed cycle cooling water in the engineered safety features systems, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.27	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.2.1.28	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.2.1.29	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.30	Stainless steel and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.2.1.31	External surfaces of steel components including ducting, piping, ducting closure bolting, and containment isolation piping external surfaces exposed to air - indoor uncontrolled (external); condensation (external) and air - outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.32	Steel piping and ducting components and internal surfaces exposed to air – indoor uncontrolled (Internal)	Loss of material due to general corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
3.2.1.33	Steel encapsulation components exposed to air-indoor uncontrolled (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Not applicable. STP has no in-scope steel encapsulation components in the engineered safety features systems, so the applicable NUREG-1801 line was not used.
3.2.1.34					Not applicable - BWR only

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.35	Steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. The containment isolation components were evaluated in the systems in which the components were found to have the function of containment integrity, so the applicable NUREG-1801 line was not used.
3.2.1.36	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope steel heat exchanger components exposed to raw water in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.37	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope stainless steel piping, piping components, and piping elements exposed to raw water in the emergency core cooling system, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.38	Stainless steel containment isolation piping and components internal surfaces exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope stainless steel components exposed to raw water in the engineered safety features systems, so the applicable NUREG-1801 line was not used.
3.2.1.39	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope stainless steel heat exchanger components exposed to raw water in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.40	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.41	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.42	Gray cast iron piping, piping components, piping elements exposed to closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope gray cast iron piping, piping components, and piping elements exposed to closed cycle cooling water in the emergency core cooling system, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.43	Gray cast iron piping, piping components, and piping elements exposed to soil	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope gray cast iron piping, piping components and piping elements exposed to soil in the emergency core cooling system, so the applicable NUREG-1801 line was not used.
3.2.1.44	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope gray cast iron motor cooler exposed to treated water in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.45	Aluminum, copper alloy >15% Zn, and steel external surfaces, bolting, and piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Consistent with NUREG-1801.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.46	Steel encapsulation components exposed to air with borated water leakage (internal)	Loss of material due to general, pitting, crevice and boric acid corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Not applicable. STP has no in-scope steel encapsulation components in the engineered safety features systems, so the applicable NUREG-1801 line was not used.
3.2.1.47	Cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS	No	Not applicable. STP has no in-scope cast austenitic stainless steel piping, piping components, and piping elements exposed to treated borated water >250°C in the emergency core cooling system, so the applicable NUREG-1801 line was not used.
3.2.1.48	Stainless steel or stainless-steel-clad steel piping, piping components, piping elements, and tanks (including safety injection tanks/accumulators) exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.49	Stainless steel piping, piping components, piping elements, and tanks exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.
3.2.1.50	Aluminum piping, piping components, and piping elements exposed to air- indoor uncontrolled (internal/external)	None	None	NA	Consistent with NUREG-1801.
3.2.1.51	Galvanized steel ducting exposed to air – indoor controlled (external)	None	None	NA	Not applicable. STP has no in-scope galvanized steel ducting exposed to air – indoor controlled (external) in the engineered safety features systems, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.52	Glass piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water	None	None	NA	Not applicable. STP has no in-scope glass piping elements in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.53	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA	Consistent with NUREG-1801.
3.2.1.54	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA	Not applicable. STP has no in-scope steel piping, piping components, and piping elements exposed to air – indoor controlled (external) in the engineered safety features systems, so the applicable NUREG-1801 line was not used.

Table 3.2.1 Summary of Aging Management Evaluations in Chapter V of NUREG-1801 for Engineered Safety Features (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.2.1.55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA	Not applicable. STP has no in-scope steel and stainless steel piping, piping components, and piping elements in concrete in the engineered safety features systems, so the applicable NUREG-1801 lines were not used.
3.2.1.56	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA	Consistent with NUREG-1801.
3.2.1.57	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA	Consistent with NUREG-1801.

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation - Containment Spray System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Eductor	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Eductor	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Flow Element	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Orifice	PB, TH	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation - Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Pump	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Spray Nozzle	SP	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Spray Nozzle	SP	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tubing	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Tubing	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A

Table 3.2.2-1 Engineered Safety Features – Summary of Aging Management Evaluation - Containment Spray System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1
Valve	PB	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.A-27	3.2.1.49	E, 1

Notes for Table 3.2.2-1:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

Plant Specific Notes:

1 Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.2.2-2 Engineered Safety Features – Summary of Aging Management Evaluation – Integrated Leak Rate Test System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blank Flange	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
Blank Flange	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	V.E-4	3.2.1.23	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	V.E-5	3.2.1.24	B
Piping	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.C-1	3.2.1.31	B
Piping	PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.C-1	3.2.1.31	B
Valve	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B

Notes for Table 3.2.2-2:

Standard Notes:

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

Plant Specific Notes:

None

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	V.E-4	3.2.1.23	B
Closure Bolting	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	V.E-5	3.2.1.24	B
Closure Bolting	LBS, PB	Stainless Steel	Borated Water Leakage (Ext)	Cracking	Bolting Integrity (B2.1.7)	IV.C2-7	3.1.1.52	B
Closure Bolting	LBS, PB	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Flow Element	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Heat Exchanger (Residual Heat Removal)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-6	3.2.1.27	B
Heat Exchanger (Residual Heat Removal)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-4	3.2.1.28	B

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-9	3.2.1.30	B
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-23	3.2.1.25	D
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Reduction of heat transfer	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	H, 1
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Heat Exchanger (Residual Heat Removal)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Heat Exchanger (RHR Pump Seal Water Cooler)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-6	3.2.1.27	B

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RHR Pump Seal Water Cooler)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-4	3.2.1.28	B
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-9	3.2.1.30	B
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-23	3.2.1.25	D
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Reduction of heat transfer	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	H, 1

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Heat Exchanger (RHR Pump Seal Water Cooler)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	C
Orifice	PB, TH	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Orifice	PB, TH	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
Orifice	PB, TH	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Piping	PB	Stainless Steel	Treated Borated Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	V.D1-27	3.2.1.01	A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Valve	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-22	3.2.1.28	B
Valve	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	V.D1-23	3.2.1.25	B
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-5	3.1.1.68	A
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Valve	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2
Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2
Valve	PB	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 2

Table 3.2.2-3 Engineered Safety Features – Summary of Aging Management Evaluation – Residual Heat Removal System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 2

Notes for Table 3.2.2-3:
Standard Notes:

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

Plant Specific Notes:

1 The reduction of heat transfer aging effect is not identified in NUREG-1801 for this component, material, and environment combination. Reduction of heat transfer is not expected in heat exchangers with reactor coolant or treated borated water environments as long as water chemistry is maintained. Reduction of heat transfer is managed with Water Chemistry (B2.1.2) and One Time Inspection (B2.1.16).
2 Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	PB	Carbon Steel with Stainless Steel Cladding	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	V.D1-1	3.2.1.45	A
Accumulator	PB	Carbon Steel with Stainless Steel Cladding	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Bellows	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Bellows	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	V.E-4	3.2.1.23	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	V.E-5	3.2.1.24	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Flow Element	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Flow Element	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	PB, TH	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Orifice	PB, TH	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
Orifice	PB, TH	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 1
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Piping	LBS, PB, SIA	Carbon Steel	Dry Gas (Int)	None	None	V.F-18	3.2.1.56	A
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Piping	PB	Stainless Steel	Dry Gas (Int)	None	None	V.F-15	3.2.1.56	A
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.D1-29	3.2.1.08	E
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-2	3.1.1.68	A
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 1
Piping	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Piping	PB	Stainless Steel	Treated Borated Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	V.D1-27	3.2.1.01	A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 1
Pump	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Solenoid Valve	PB	Stainless Steel	Dry Gas (Int)	None	None	V.F-15	3.2.1.56	A
Solenoid Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Strainer	FIL	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Tank	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	C
Tank	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	C
Tank	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.D1-29	3.2.1.08	E
Tank	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Tubing	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	Dry Gas (Int)	None	None	V.F-15	3.2.1.56	A
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Valve	PB, SIA	Carbon Steel	Dry Gas (Int)	None	None	V.F-18	3.2.1.56	A
Valve	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	V.E-7	3.2.1.31	B
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel	Dry Gas (Int)	None	None	V.F-15	3.2.1.56	A
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-5	3.1.1.68	A
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 1

Table 3.2.2-4 Engineered Safety Features – Summary of Aging Management Evaluation – Safety Injection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	IV.C2-25	3.1.1.08	A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 1
Valve	PB	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	V.F-13	3.2.1.57	A
Valve	PB	Stainless Steel Cast Austenitic	Dry Gas (Int)	None	None	V.F-15	3.2.1.56	A
Valve	PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	V.F-12	3.2.1.53	A
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-30	3.2.1.49	E, 1
Valve	PB	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	V.D1-31	3.2.1.48	E, 1

Notes for Table 3.2.2-4:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 Introduction

Section 3.3 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.3.3, Auxiliary Systems, subject to AMR. These systems are described in the following sections:

- Fuel handling system (Section 2.3.3.1)
- Spent fuel pool cooling and cleanup system (Section 2.3.3.2)
- Cranes and hoists (Section 2.3.3.3)
- Essential cooling water and ECW screen wash system (Section 2.3.3.4)
- Reactor makeup water system (Section 2.3.3.5)
- Component cooling water system (Section 2.3.3.6)
- Compressed air system (Section 2.3.3.7)
- Primary process sampling system (Section 2.3.3.8)
- Chilled water HVAC system (Section 2.3.3.9)
- Electrical auxiliary building and control room HVAC system (Section 2.3.3.10)
- Fuel handling building HVAC system (Section 2.3.3.11)
- Mechanical auxiliary building HVAC system (Section 2.3.3.12)
- Miscellaneous HVAC systems (In Scope) (Section 2.3.3.13)
- Containment building HVAC system (Section 2.3.3.14)
- Standby diesel generator building HVAC system (Section 2.3.3.15)
- Containment hydrogen monitoring and combustible gas control system (Section 2.3.3.16)
- Fire protection system (Section 2.3.3.17)
- Standby diesel generator fuel oil storage and transfer system (Section 2.3.3.18)
- Chemical and volume control system (Section 2.3.3.19)
- Standby diesel generator and auxiliaries system (Section 2.3.3.20)
- Nonsafety-related diesel generators and auxiliary fuel oil system (Section 2.3.3.21)

- Liquid waste processing system (Section 2.3.3.22)
- Radioactive vents and drains system (Section 2.3.3.23)
- Nonradioactive waste plumbing drains and sumps system (Section 2.3.3.24)
- Oily waste system (Section 2.3.3.25)
- Radiation monitoring (area and process) mechanical system (Section 2.3.3.26)
- Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Section 2.3.3.27) includes:
  Boron recycling
  Condensate storage
  Condensate
  Essential cooling pond makeup
  Gaseous waste processing
  Low pressure nitrogen
  MAB plant vent header (radioactive)
  Nonradioactive chemical waste
  Open loop auxiliary cooling
  Potable water and well water
  Secondary process sampling
  Solid waste processing
  Turbine vents and drains

Table 3.3.1, Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems, provides the summary of the programs evaluated in NUREG-1801 that are applicable to the component types in this section. Table 3.3.1 uses the format of Table 1 described in Section 3.0.

3.3.2 Results

The following tables summarize the results of the AMR for the systems in the Auxiliary Systems area:

- Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System
- Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System
- Table 3.3.2-3 Auxiliary Systems – Summary of Aging Management Evaluation – Cranes and Hoists
- Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System

- Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Makeup Water System
- Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System
- Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System
- Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System
- Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System
- Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System
- Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System
- Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System
- Table 3.3.2-13 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous HVAC Systems (In Scope)
- Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Building HVAC System
- Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Building HVAC System
- Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Hydrogen Monitoring and Combustible Gas Control System
- Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System
- Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System
- Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System
- Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries System
- Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System

- Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System
- Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System
- Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing Drains and Sump System
- Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste System
- Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System
- Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2)

These tables use the format of Table 2 discussed in Section 3.0.

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

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.3.2.1.1 Fuel Handling System

Materials

The materials of construction for the fuel handling system component types are:

- Carbon Steel
- Stainless Steel

Environment

The fuel handling system components are exposed to the following environments:

- Borated Water Leakage
- Plant Indoor Air
- Treated Borated Water

Aging Effects Requiring Management

The following fuel handling system aging effects require management:

- Cracking
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the fuel handling system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)
- One-Time Inspection (B2.1.16)
- Structures Monitoring Program (B2.1.32)
- Water Chemistry (B2.1.2)

3.3.2.1.2 Spent Fuel Pool Cooling and Cleanup System

Materials

The materials of construction for the spent fuel pool cooling and cleanup system component types are:

- Carbon Steel
- Stainless Steel

Environment

The spent fuel pool cooling and cleanup system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water
- Plant Indoor Air
- Treated Borated Water

Aging Effects Requiring Management

The following spent fuel pool cooling and cleanup system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the spent fuel pool cooling and cleanup system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.3.2.1.3 Cranes and Hoists

Materials

The materials of construction for the cranes and hoists component types are:

- Carbon Steel

Environment

The cranes and hoists component types are exposed to the following environments:

- Plant Indoor Air

Aging Effects Requiring Management

The following cranes and hoists aging effects require management:

- Loss of material

Aging Management Programs

The following aging management programs manage the aging effects for the cranes and hoists component types:

- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)

3.3.2.1.4 Essential Cooling Water and ECW Screen Wash System

Materials

The materials of construction for the essential cooling water and ECW screen wash system component types are:

- Aluminum
- Carbon Steel
- Carbon Steel clad with Copper-Nickel
- Copper Alloy
- Copper Alloy (Aluminum > 8 percent)
- Ductile Iron
- Nickel-Alloys
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The essential cooling water and ECW screen wash system components are exposed to the following environments:

- Buried
- Plant Indoor Air
- Raw Water

Aging Effects Requiring Management

The following essential cooling water and ECW screen wash system aging effects require management:

- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the essential cooling water and ECW screen wash system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- External Surfaces Monitoring Program (B2.1.20)
- Open-Cycle Cooling Water System (B2.1.9)
- Selective Leaching of Aluminum Bronze (B2.1.37)
- Selective Leaching of Materials (B2.1.17)

3.3.2.1.5 Reactor Makeup Water System

Materials

The materials of construction for the reactor makeup water system component types are:

- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The reactor makeup water system components are exposed to the following environments:

- Demineralized Water
- Plant Indoor Air

Aging Effects Requiring Management

The following reactor makeup water system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the reactor makeup water system component types:

- Bolting Integrity (B2.1.7)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.3.2.1.6 Component Cooling Water System

Materials

The materials of construction for the component cooling water system component types are:

- Carbon Steel
- Copper Alloy
- Glass
- Stainless Steel
- Titanium

Environment

The component cooling water system component types are exposed to the following environments:

- Closed-Cycle Cooling Water
- Demineralized Water
- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Raw Water
- Treated Borated Water

Aging Effects Requiring Management

The following component cooling water system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the component cooling water system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Open-Cycle Cooling Water System (B2.1.9)
- Water Chemistry (B2.1.2)

3.3.2.1.7 Compressed Air System

Materials

The materials of construction for the compressed air system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Cast Iron
- Copper Alloy
- Copper Alloy (> 15 percent Zinc)
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The compressed air system component types are exposed to the following environments:

- Closed Cycle Cooling Water
- Lubricating Oil
- Plant Indoor Air

Aging Effects Requiring Management

The following compressed air system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the compressed air system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Selective Leaching of Materials (B2.1.17)

3.3.2.1.8 Primary Process Sampling System

Materials

The materials of construction for the primary process sampling system component types are:

- Carbon Steel
- Stainless Steel

Environment

The primary process sampling system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water
- Demineralized Water
- Plant Indoor Air
- Treated Borated Water

Aging Effects Requiring Management

The following primary process sampling system aging effects require management:

- Cracking
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the primary process sampling system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.3.2.1.9 Chilled Water HVAC System

Materials

The materials of construction for the chilled water HVAC system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Cast Iron
- Copper Alloy
- Copper Alloy (> 15 percent Zinc)
- Glass
- Stainless Steel
- Titanium

Environment

The chilled water HVAC system component types are exposed to the following environments:

- Closed-Cycle Cooling Water

- Demineralized Water
- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Raw Water

Aging Effects Requiring Management

The following chilled water HVAC system aging effects require management:

- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the chilled water HVAC system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Open-Cycle Cooling Water System (B2.1.9)
- Selective Leaching of Materials (B2.1.17)
- Water Chemistry (B2.1.2)

3.3.2.1.10 Electrical Auxiliary Building and Control Room HVAC System

Materials

The materials of construction for the electrical auxiliary building and control room HVAC system component types are:

- Aluminum
- Carbon Steel
- Carbon Steel (Galvanized)
- Copper Alloy

- Elastomer
- Stainless Steel

Environment

The electrical auxiliary building and control room HVAC system component types are exposed to the following environments:

- Closed-Cycle Cooling Water
- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following electrical auxiliary building and control room HVAC system aging effects require management:

- Hardening and loss of strength
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the electrical auxiliary building and control room HVAC system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.11 Fuel Handling Building HVAC System

Materials

The materials of construction for the fuel handling building HVAC system component types are:

- Aluminum

- Carbon Steel
- Carbon Steel (Galvanized)
- Copper Alloy
- Elastomer
- Stainless Steel

Environment

The fuel handling building HVAC system component types are exposed to the following environments:

- Atmosphere/ Weather
- Closed-Cycle Cooling Water
- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following fuel handling building HVAC system aging effects require management:

- Hardening and loss of strength
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the fuel handling building HVAC system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.12 Mechanical Auxiliary Building HVAC System

Materials

The materials of construction for the mechanical auxiliary building HVAC system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Copper Alloy
- Elastomer
- Polyvinyl Chloride (PVC)
- Stainless Steel

Environment

The mechanical auxiliary building HVAC system component types are exposed to the following environments:

- Atmosphere/ Weather
- Closed-Cycle Cooling Water
- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following mechanical auxiliary building HVAC system aging effects require management:

- Hardening and loss of strength Hardening and loss of strength
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the mechanical auxiliary building HVAC system component types:

- Bolting Integrity (B2.1.7)

- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.13 Miscellaneous HVAC Systems (In Scope)

Materials

The materials of construction for the miscellaneous HVAC systems (In Scope) component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Elastomer

Environment

The miscellaneous HVAC systems (In Scope) component types are exposed to the following environments:

- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following miscellaneous HVAC systems (In Scope) aging effects require management:

- Hardening and loss of strength
- Loss of material

Aging Management Programs

The following aging management programs manage the aging effects for the miscellaneous HVAC systems (In Scope) component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.14 Reactor Containment Building HVAC System

Materials

The materials of construction for the reactor containment building HVAC system component types are:

- Aluminum
- Carbon Steel
- Carbon Steel (Galvanized)
- Copper Alloy
- Elastomer
- Stainless Steel

Environment

The reactor containment building HVAC system component types are exposed to the following environments:

- Atmosphere/ Weather
- Closed-Cycle Cooling Water
- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following reactor containment building HVAC system aging effects require management:

- Hardening and loss of strength
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the reactor containment building HVAC system component types:

- Bolting Integrity (B2.1.7)

- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.15 Standby Diesel Generator Building HVAC System

Materials

The materials of construction for the standby diesel generator building HVAC system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Elastomer
- Stainless Steel

Environment

The standby diesel generator building HVAC system component types are exposed to the following environments:

- Encased in Concrete
- Plant Indoor Air
- Ventilation Atmosphere

Aging Effects Requiring Management

The following standby diesel generator building HVAC system aging effects require management:

- Hardening and loss of strength
- Loss of material

Aging Management Programs

The following aging management programs manage the aging effects for the standby diesel generator building HVAC system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)

- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.16 Containment Hydrogen Monitoring and Combustible Gas Control System

Materials

The materials of construction for the containment hydrogen monitoring and combustible gas control system component types are:

- Glass
- Stainless Steel

Environment

The containment hydrogen monitoring and combustible gas control system component types are exposed to the following environment:

- Plant Indoor Air

Aging Effects Requiring Management

The following containment hydrogen monitoring and combustible gas control system aging effects require management:

- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the containment hydrogen monitoring and combustible gas control system component types:

- Bolting Integrity (B2.1.7)

3.3.2.1.17 Fire Protection System

Materials

The materials of construction for the fire protection system component types are:

- Aluminum
- Carbon Steel
- Carbon Steel (Galvanized)
- Cast Iron

- Cast Iron (Gray Cast Iron)
- Copper Alloy
- Ductile Iron
- Stainless Steel

Environment

The fire protection system component types are exposed to the following environments:

- Atmosphere/ Weather
- Buried
- Closed-Cycle Cooling Water
- Diesel Exhaust
- Dry Gas
- Encased in Concrete
- Fuel Oil
- Plant Indoor Air
- Raw Water
- Ventilation Atmosphere

Aging Effects Requiring Management

The following fire protection system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the fire protection system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)

- Fire Protection (B2.1.12)
- Fire Water System (B2.1.13)
- Fuel Oil Chemistry (B2.1.14)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Selective Leaching of Materials (B2.1.17)

3.3.2.1.18 Standby Diesel Generator Fuel Oil Storage and Transfer System

Materials

The materials of construction for the standby diesel generator fuel oil storage and transfer system component types are:

- Aluminum
- Carbon Steel
- Copper Alloy
- Elastomer
- Stainless Steel

Environment

The standby diesel generator fuel oil storage and transfer system component types are exposed to the following environments:

- Atmosphere/ Weather
- Buried
- Fuel Oil
- Plant Indoor Air

Aging Effects Requiring Management

The following standby diesel generator fuel oil storage and transfer system aging effects require management:

- Hardening and loss of strength
- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the standby diesel generator fuel oil storage and transfer system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- External Surfaces Monitoring Program (B2.1.20)
- Fuel Oil Chemistry (B2.1.14)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)

3.3.2.1.19 Chemical and Volume Control System

Materials

The materials of construction for the chemical and volume control system component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper Alloy
- Insulation Calcium Silicate
- Insulation Fiberglass
- Nickel Alloys
- Stainless Steel
- Thermoplastics

Environment

The chemical and volume control system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water
- Demineralized Water

- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Reactor Coolant
- Secondary Water
- Steam
- Treated Borated Water
- Zinc Acetate

Aging Effects Requiring Management

The following chemical and volume control system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the chemical and volume control system component types:

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B2.1.1)
- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.19)
- Water Chemistry (B2.1.2)

3.3.2.1.20 Standby Diesel Generator and Auxiliaries System

Materials

The materials of construction for the standby diesel generator and auxiliaries system component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper Alloy
- Glass
- Stainless Steel
- Titanium

Environment

The standby diesel generator and auxiliaries system component types are exposed to the following environments:

- Closed-Cycle Cooling Water
- Diesel Exhaust
- Dry Gas
- Fuel Oil
- Lubricating Oil
- Plant Indoor Air
- Raw Water

Aging Effects Requiring Management

The following standby diesel generator and auxiliaries system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the standby diesel generator and auxiliaries system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Fuel Oil Chemistry (B2.1.14)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Open-Cycle Cooling Water System (B2.1.9)

3.3.2.1.21 Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System

Materials

The materials of construction for the nonsafety-related diesel generators and auxiliary fuel oil system component types are:

- Aluminum
- Carbon Steel
- Copper Alloy
- Glass
- Stainless Steel

Environment

The nonsafety-related diesel generators and auxiliary fuel oil system component types are exposed to the following environments:

- Atmosphere/ Weather
- Closed-Cycle Cooling Water
- Diesel Exhaust
- Fuel Oil
- Lubricating Oil

- Plant Indoor Air

Aging Effects Requiring Management

The following nonsafety-related diesel generators and auxiliary fuel oil system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the nonsafety-related diesel generators and auxiliary fuel oil system component types:

- Bolting Integrity (B2.1.7)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Fuel Oil Chemistry (B2.1.14)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)

3.3.2.1.22 Liquid Waste Processing System

Materials

The materials of construction for the liquid waste processing system component types are:

- Carbon Steel
- Cast Iron
- Copper Alloy
- Glass
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The liquid waste processing system component types are exposed to the following environments:

- Borated Water Leakage
- Closed-Cycle Cooling Water
- Demineralized Water
- Dry Gas
- Plant Indoor Air
- Raw Water
- Secondary Water
- Sodium Hydroxide
- Steam
- Treated Borated Water

Aging Effects Requiring Management

The following liquid waste processing system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the liquid waste processing system component types:

- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.3.2.1.23 Radioactive Vents and Drains System

Materials

The materials of construction for the radioactive vents and drains system component types are:

- Carbon Steel
- Ductile Iron
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The radioactive vents and drains system component types are exposed to the following environments:

- Borated Water Leakage
- Demineralized Water
- Encased in Concrete
- Plant Indoor Air
- Raw Water
- Treated Borated Water
- Ventilation Atmosphere

Aging Effects Requiring Management

The following radioactive vents and drains system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the radioactive vents and drains system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.3.2.1.24 Nonradioactive Waste Plumbing Drains and Sump System

Materials

The materials of construction for the nonradioactive waste plumbing drains and sump system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Cast Iron
- Cast Iron (Gray Cast Iron)
- Copper Alloy
- Ductile Iron
- Polyvinyl Chloride (PVC)
- Stainless Steel

Environment

The nonradioactive waste plumbing drains and sump system component types are exposed to the following environments:

- Atmosphere/ Weather
- Encased in Concrete
- Plant Indoor Air
- Raw Water

Aging Effects Requiring Management

The following nonradioactive waste plumbing drains and sump system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the nonradioactive waste plumbing drains and sump system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Open-Cycle Cooling Water System (B2.1.9)
- Selective Leaching of Materials (B2.1.17)

3.3.2.1.25 Oily Waste System

Materials

The materials of construction for the oily waste system component types are:

- Carbon Steel
- Carbon Steel (Galvanized)
- Cast Iron
- Copper Alloy
- Ductile Iron
- Stainless Steel

Environment

The oily waste system component types are exposed to the following environments:

- Buried
- Encased in Concrete
- Plant Indoor Air
- Raw Water

Aging Effects Requiring Management

The following oily waste system aging effect requires management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the oily waste system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.26 Radiation Monitoring (area and process) Mechanical System

Materials

The materials of construction for the radiation monitoring (area and process) mechanical system component types are:

- Carbon Steel
- Elastomer
- Glass
- Stainless Steel

Environment

The radiation monitoring (area and process) mechanical system component types are exposed to the following environment:

- Plant Indoor Air

Aging Effects Requiring Management

The following radiation monitoring (area and process) mechanical system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the radiation monitoring (area and process) mechanical system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

3.3.2.1.27 Miscellaneous Systems In-Scope ONLY based on Criterion 10 CFR 54.4(a)(2)

Materials

The materials of construction for the miscellaneous systems in scope ONLY based on Criterion 10 CFR 54.4(a)(2) component types are:

- Aluminum
- Carbon Steel
- Cast Iron
- Copper Alloy
- Copper Alloy (Aluminum > 8 percent)
- Copper Alloy (Zinc > 15 percent)
- Ductile Iron
- Glass
- Nickel-Alloys
- Polyvinyl Chloride (PVC)
- Stainless Steel

Environment

The miscellaneous systems in scope ONLY based on Criterion 10 CFR 54.4(a)(2) component types are exposed to the following environments:

- Atmosphere/ Weather
- Borated Water Leakage
- Buried
- Closed-Cycle Cooling Water
- Demineralized Water
- Dry Gas
- Plant Indoor Air
- Potable Water
- Raw Water
- Secondary Water
- Sodium Hydroxide

- Treated Borated Water

Aging Effects Requiring Management

The following miscellaneous systems in-scope ONLY based on Criterion 10 CFR 54.4(a)(2) aging effects require management:

- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the miscellaneous systems in scope ONLY based on Criterion 10 CFR 54.4(a)(2) component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- Closed-Cycle Cooling Water System (B2.1.10)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Selective Leaching of Aluminum Bronze (B2.1.37)
- Selective Leaching of Materials (B2.1.17)
- Water Chemistry (B2.1.2)

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation. For the auxiliary systems, those evaluations are addressed in the following subsections.

3.3.2.2.1 Cumulative Fatigue Damage

Cumulative fatigue damage of auxiliary system piping and heat exchangers, and the number of significant lifts assumed for design of load handling cranes, are TLAAs as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1).

[3.3.1.01] Section 4.7.1 describes the evaluation of load handling crane TLAAs.

[3.3.1.02] STP piping outside the reactor coolant pressure boundary is designed to ASME III Class 2, Class 3, and ANSI B31.1, all of which require a reduction in the allowable secondary stress range if more than 7,000 full-range thermal cycles are expected in a design lifetime. Section 4.3.5 describes the evaluation of these cyclic piping design TLAAs.

A survey of other than ASME III Class 1 pressure-retaining components (vessels, heat exchangers, pumps, and valves) discovered the feedwater control valves, with Class 1 fatigue analysis. See Section 4.3.2.12.

3.3.2.2.2 Reduction of Heat Transfer due to Fouling

Not applicable to STP, applicable to BWR only.

3.3.2.2.3 Cracking due to Stress Corrosion Cracking (SCC)

3.3.2.2.3.1 Stainless steel piping and components of BWR standby liquid control system exposed to sodium pentaborate

Not applicable to STP, applicable to BWR only.

3.3.2.2.3.2 Stainless steel heat exchanger components exposed to treated water

Not applicable to STP, applicable to BWR only.

3.3.2.2.3.3 Stainless steel diesel engine exhaust piping and components exposed to diesel exhaust

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages cracking from stress corrosion cracking for stainless steel internal surfaces exposed to diesel exhaust.

3.3.2.2.4 Cracking due to Stress Corrosion Cracking and Cyclic Loading

3.3.2.2.4.1 Stainless steel PWR non-regenerative heat exchanger components exposed to borated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage cracking due to stress corrosion cracking and cyclic loading for stainless steel letdown (non-regenerative) heat exchanger exposed to treated borated water. The one-time inspection will include selected components at susceptible locations.

Temperature and radioactivity of the shell-side water of the letdown (non-regenerative) heat exchanger is monitored continuously by installed plant instrumentation.

The One-Time Inspection program (B2.1.16) is selected in lieu of eddy-current testing of tubes to provide confirmation that cracking is not occurring. The continuous monitoring of temperature and radioactivity of the shell-side water together with one-time inspection provide early indication of cracking in the letdown (non-regenerative) heat exchanger prior to the loss of intended function.

3.3.2.2.4.2 Stainless steel PWR regenerative heat exchanger components exposed to borated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage cracking due to stress corrosion cracking and cyclic loading for stainless steel heat exchangers exposed to treated borated water. The one-time inspection will include selected components at susceptible locations.

3.3.2.2.4.3 Stainless steel pump casings in the chemical and volume control system

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage cracking due to stress corrosion cracking and cyclic loading for stainless steel pump casings exposed to treated borated water. The one-time inspection will include selected components at susceptible locations.

3.3.2.2.4.4 High strength bolting exposed to steam or water leakage

Not applicable. STP has no in-scope high-strength steel closure bolting exposed to air with steam or water leakage in the chemical and volume control system, so the applicable NUREG-1801 line was not used.

3.3.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

3.3.2.2.5.1 Elastomer seals of HVAC systems exposed to air-indoor (uncontrolled)

The External Surfaces Monitoring Program (B2.1.20) manages the hardening and loss of strength from elastomer degradation for elastomer external surfaces exposed to plant indoor air (uncontrolled).

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the hardening and loss of strength from elastomer degradation for elastomer internal surfaces exposed to ventilation atmosphere.

3.3.2.2.5.2 Elastomers in Auxiliary Systems Exposed to a Treated Borated Water Environments

Not applicable. STP has no in-scope elastomer lined components exposed to treated or treated borated water in the spent fuel pool cooling and cleanup system, so the applicable NUREG-1801 lines were not used.

3.3.2.2.6 Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion

Not applicable. STP does not employ boral or boron steel in spent fuel storage racks to maintain subcriticality. STP uses soluble boron to provide criticality safety margin by maintaining $k_{eff} < 0.95$ including uncertainties, tolerances, and accident conditions in the presence of spent fuel pool soluble boron.

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

3.3.2.2.7.1 Steel piping and components in the reactor coolant pump oil collection system exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manage loss of material due to general, pitting, and crevice corrosion for carbon steel (including galvanized) and cast iron components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

For the RCP lube oil collection system tank, the Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manage loss of material due to general, pitting, and crevice corrosion for steel (including galvanized steel) exposed to lubricating oil and the One-Time Inspection program (B2.1.16) will evaluate the thickness of the lower portion of the tank.

3.3.2.2.7.2 Steel piping and components in BWR reactor water cleanup and shutdown cooling systems exposed to treated water

Not applicable to STP, applicable to BWR only.

3.3.2.2.7.3 Steel diesel exhaust piping and components exposed to diesel exhaust

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the loss of material from general, pitting, and crevice corrosion for carbon steel internal surfaces exposed to diesel exhaust.

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

The Buried Piping and Tanks Inspection program (B2.1.18) manages the loss of material due to general, pitting, crevice and microbiologically influenced corrosion for the carbon steel (including cast iron and ductile iron) external surfaces of buried components.

3.3.2.2.9 Loss of Material due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion and Fouling

3.3.2.2.9.1 Steel piping and components exposed to fuel oil

The Fuel Oil Chemistry program (B2.1.14) and the One-Time Inspection program (B2.1.16) manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion for carbon steel components in the fuel oil system. The one-time inspection will include selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations and tank bottoms).

3.3.2.2.9.2 Steel heat exchanger components exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manage loss of material due to general, pitting, crevice, and microbiologically influenced corrosion and fouling for carbon steel components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

3.3.2.2.10 Loss of Material due to Pitting and Crevice Corrosion

3.3.2.2.10.1 Elastomer lined and stainless steel clad components exposed to treated or treated borated water

Not applicable. STP has no in-scope components constructed of steel with elastomer lining or steel with stainless steel cladding exposed to treated or treated borated water in the spent fuel pool cooling and cleanup system, so the applicable NUREG-1801 lines were not used.

3.3.2.2.10.2 Stainless steel, aluminum, and stainless steel clad heat exchanger components exposed to treated water

Not applicable to STP, applicable to BWR only.

3.3.2.2.10.3 Copper alloy HVAC piping and components exposed to condensation (external)

The External Surfaces Monitoring Program (B2.1.20) manages the loss of material from pitting and crevice corrosion for copper alloy external surfaces exposed to plant indoor air.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the loss of material from pitting and crevice corrosion for copper alloy internal surfaces exposed to ventilation atmosphere.

3.3.2.2.10.4 Copper alloy piping and components exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion for copper, bronze, and brass components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

3.3.2.2.10.5 HVAC aluminum piping and components and stainless steel ducting and components exposed to condensation

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the loss of material from pitting and crevice corrosion for stainless steel and aluminum internal surfaces exposed to ventilation atmosphere and condensation.

3.3.2.2.10.6 Copper alloy piping and components exposed to internal condensation

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the loss of material from pitting and crevice corrosion for copper alloy internal surfaces exposed to internal condensation and moisture.

3.3.2.2.10.7 Stainless steel piping and components exposed to soil

Not applicable. STP has no in-scope stainless steel piping, piping components, and piping elements exposed to soil in the auxiliary systems so the applicable NUREG-1801 line was not used.

3.3.2.2.10.8 Stainless steel piping and components of BWR standby liquid control system exposed to sodium pentaborate

Not applicable to STP, applicable to BWR only.

3.3.2.2.11 Loss of Material due to Pitting, Crevice, and Galvanic Corrosion

Not applicable to STP, applicable to BWR only.

3.3.2.2.12 Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.3.2.2.12.1 Stainless steel, aluminum, and copper alloy piping and components exposed to fuel oil

The Fuel Oil Chemistry program (B2.1.14) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting, crevice and microbiologically influenced corrosion for stainless steel and copper components exposed to fuel oil. The one-time inspection will include selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.3.2.2.12.2 Stainless steel piping and components exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting, crevice, and microbiologically influenced corrosion for stainless steel components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

For the RCP lube oil collection system, the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages loss of material due to pitting, crevice, and microbiologically influenced corrosion for stainless steel components exposed to lubricating oil.

3.3.2.2.13 Loss of Material due to Wear

The External Surfaces Monitoring Program (B2.1.20) manages the loss of material due to wear from elastomer degradation for elastomer external surfaces exposed to plant indoor air (uncontrolled) in locations where relative motion of adjacent surfaces is possible. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages the loss of material due to wear from elastomer degradation for elastomer internal surfaces exposed to plant indoor air (internal) and ventilation atmosphere in locations where relative motion of adjacent surfaces is possible.

3.3.2.2.14 Loss of Material due to Cladding Breach

Not applicable. STP has no in-scope pumps in the chemical and volume control system that are steel with stainless steel cladding exposed to treated borated water, so the applicable NUREG-1801 line was not used.

3.3.2.2.15 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.3.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the auxiliary systems components. The section of Chapter 4 that contains the TLAA review results is indicated in parenthesis.

- Cumulative Fatigue Damage (Section 4.3, Metal Fatigue Analysis)
- Crane Load Cycle Limits (Section 4.7.1, Crane Cycle Load Limits)

3.3.3 Conclusions

The auxiliary systems component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the auxiliary systems component types are identified in the summary Tables and in Section 3.3.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the auxiliary systems component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.01	Steel cranes - structural girders exposed to air – indoor uncontrolled (external)	Cumulative fatigue damage	TLAA to be evaluated for structural girders of cranes. See the Standard Review Plan, Section 4.7 for generic guidance for meeting the requirements of 10 CFR 54.21(c)(1).	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.3.2.2.1.
3.3.1.02	Steel and stainless steel piping, piping components, piping elements, and heat exchanger components exposed to air – indoor uncontrolled, treated borated water or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.3.2.2.1.
3.3.1.03					Not applicable - BWR only
3.3.1.04					Not applicable - BWR only
3.3.1.05					Not applicable - BWR only

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.06	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). See further evaluation in Section 3.3.2.2.3.3.
3.3.1.07	Stainless steel non-regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry (B2.1.2) and a plant-specific verification program. An acceptable verification program is to include temperature and radioactivity monitoring of the shell side water, and eddy current testing of tubes.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) See further evaluation in Section 3.3.2.2.4.1.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.08	Stainless steel regenerative heat exchanger components exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry (B2.1.2) and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16). See further evaluation in Section 3.3.2.2.4.2.
3.3.1.09	Stainless steel high-pressure pump casing in PWR chemical and volume control system	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry (B2.1.2) and a plant-specific verification program. The AMP is to be augmented by verifying the absence of cracking due to stress corrosion cracking and cyclic loading. A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) See further evaluation in Section 3.3.2.2.4.3.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.10	High-strength steel closure bolting exposed to air with steam or water leakage.	Cracking due to stress corrosion cracking, cyclic loading	Bolting Integrity (B2.1.7) The AMP is to be augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	Yes	Not applicable. STP has no in-scope high-strength steel closure bolting exposed to air with steam or water leakage in the chemical and volume control system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.3.2.2.4.4.
3.3.1.11	Elastomer seals and components exposed to air – indoor uncontrolled (internal/external)	Hardening and loss of strength due to elastomer degradation	A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management programs used to manage aging includes Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) for internal surface exposure and External Surfaces Monitoring (B2.1.20) for external surface exposure. See further evaluation in Section 3.3.2.2.5.1.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.12	Elastomer lining exposed to treated water or treated borated water	Hardening and loss of strength due to elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes	Not applicable. STP has no in-scope elastomer lined components exposed to treated or treated borated water in the spent fuel pool cooling and cleanup system, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.3.2.2.5.2.
3.3.1.13	Boral, boron steel spent fuel storage racks neutron-absorbing sheets exposed to treated water or treated borated water	Reduction of neutron-absorbing capacity and loss of material due to general corrosion	A plant specific aging management program is to be evaluated.	Yes	Not applicable. STP does not employ boral or boron steel in spent fuel storage racks to maintain subcriticality. STP uses soluble boron to provide criticality safety margin by maintaining k_{eff} <.0.95 including uncertainties, tolerances, and accident conditions in the presence of spent fuel pool soluble boron. See further evaluation in Section 3.3.2.2.6.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.14	Steel piping, piping component, and piping elements exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.7.1.
3.3.1.15	Steel reactor coolant pump oil collection system piping, tubing, and valve bodies exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.7.1.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.16	Steel reactor coolant pump oil collection system tank exposed to lubricating oil	Loss of material due to general, pitting, and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16) to evaluate the thickness of the lower portion of the tank	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.7.1.
3.3.1.17					Not applicable - BWR only
3.3.1.18	Stainless steel and steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Loss of material/ general (steel only), pitting and crevice corrosion	A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). See further evaluation in Section 3.3.2.2.7.3.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.19	Steel (with or without coating or wrapping) piping, piping components, and piping elements exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion	Buried Piping and Tanks Inspection (B2.1.18)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Buried Piping and Tanks Inspection (B2.1.18). See further evaluation in Section 3.3.2.2.8.
3.3.1.20	Steel piping, piping components, piping elements, and tanks exposed to fuel oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fuel Oil Chemistry (B2.1.14). See further evaluation in Section 3.3.2.2.9.1.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.21	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.9.2.
3.3.1.22	Steel with elastomer lining or stainless steel cladding piping, piping components, and piping elements exposed to treated water and treated borated water	Loss of material due to pitting and crevice corrosion (only for steel after lining/cladding degradation)	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in-scope components constructed of steel with elastomer lining or steel with stainless steel cladding exposed to treated or treated borated water in the fuel pool cooling and clean-up system, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.3.2.2.10.1.
3.3.1.23					Not applicable - BWR only
3.3.1.24					Not applicable - BWR only

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.25	Copper alloy HVAC piping, piping components, piping elements exposed to condensation (external)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management programs used to manage aging include Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) for internal surface exposure and External Surfaces Monitoring (B2.1.20) for external surface exposure. See further evaluation in Section 3.3.2.2.10.3.
3.3.1.26	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.10.4.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.27	Stainless steel HVAC ducting and aluminum HVAC piping, piping components and piping elements exposed to condensation	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). See further evaluation in Section 3.3.2.2.10.5.
3.3.1.28	Copper alloy fire protection piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). See further evaluation in Section 3.3.2.2.10.6.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.29	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Not applicable. STP has no in-scope stainless steel piping, piping components, and piping elements exposed to soil in the auxiliary systems so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.3.2.2.10.7.
3.3.1.30					Not applicable - BWR only
3.3.1.31					Not applicable - BWR only
3.3.1.32	Stainless steel, aluminum and copper alloy piping, piping components, and piping elements exposed to fuel oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fuel Oil Chemistry (B2.1.14). See further evaluation in Section 3.3.2.2.12.1.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.33	Stainless steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.3.2.2.12.2.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.34	Elastomer seals and components exposed to air – indoor uncontrolled (internal or external)	Loss of material due to Wear	A plant specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant specific aging management programs used to manage the surfaces of elastomer components exposed to air - indoor uncontrolled for loss of material - wear are External Surfaces Monitoring Program (B2.1.20) for external surfaces and Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program (B2.1.22) for internal surfaces. See further evaluation in Section 3.3.2.2.13.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.35	Steel with stainless steel cladding pump casing exposed to treated borated water	Loss of material due to cladding breach	A plant-specific aging management program is to be evaluated. Reference NRC Information Notice 94-63, *Boric Acid Corrosion of Charging Pump Casings Caused by Cladding Cracks.*	Yes	Not applicable. STP has no in-scope pumps in the chemical and volume control system that are steel with stainless steel cladding exposed to treated borated water, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.3.2.2.14.
3.3.1.36					Not applicable - BWR only
3.3.1.37					Not applicable - BWR only
3.3.1.38					Not applicable - BWR only
3.3.1.39					Not applicable - BWR only
3.3.1.40	Steel tanks in diesel fuel oil system exposed to air - outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	Not applicable. STP has no in-scope steel tanks in the standby diesel engine fuel oil storage and transfer system exposed to air - outdoor (external), so the applicable NUREG-1801 line was not used.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.41	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity (B2.1.7)	No	Not applicable. STP has no in-scope high-strength steel closure bolting in the auxiliary systems, so the applicable NUREG-1801 line was not used.
3.3.1.42	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity (B2.1.7)	No	Not applicable. STP has no in-scope steel closure bolting exposed to air with steam or water leakage in the auxiliary systems, so the applicable NUREG-1801 line was not used.
3.3.1.43	Steel bolting and closure bolting exposed to air – indoor uncontrolled (external) or air – outdoor (External)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.3.1.44	Steel compressed air system closure bolting exposed to condensation	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity (B2.1.7)	No	Not applicable. STP has no in-scope steel closure bolting exposed to condensation in the compressed air system, so the applicable NUREG-1801 line was not used.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.45	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.3.1.46	Stainless steel and stainless clad steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.3.1.47	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.48	Steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.3.1.49					Not applicable - BWR only
3.3.1.50	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.3.1.51	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.52	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.3.1.53	Steel compressed air system piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general and pitting corrosion	Compressed Air Monitoring	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) is credited.
3.3.1.54	Stainless steel compressed air system piping, piping components, and piping elements exposed to internal condensation	Loss of material due to pitting and crevice corrosion	Compressed Air Monitoring	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) is credited.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.55	Steel ducting closure bolting exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)
3.3.1.56	Steel HVAC ducting and components external surfaces exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)
3.3.1.57	Steel piping and components external surfaces exposed to air – indoor uncontrolled (External)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.58	Steel external surfaces exposed to air – indoor uncontrolled (external), air - outdoor (external), and condensation (external)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 for components being managed by the External Surfaces Monitoring Program (B2.1.20) with aging management program exceptions: The Fire Protection Program (B2.1.12) manages the external surfaces of halon piping components used for fire suppression.
3.3.1.59	Steel heat exchanger components exposed to air – indoor uncontrolled (external) or air -outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.60	Steel piping, piping components, and piping elements exposed to air - outdoor (external)	Loss of material due to general, pitting, and crevice corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)
3.3.1.61	Elastomer fire barrier penetration seals exposed to air – outdoor or air - indoor uncontrolled	Increased hardness, shrinkage and loss of strength due to weathering	Fire Protection (B2.1.12)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12)
3.3.1.62	Aluminum piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Fire Protection (B2.1.12)	No	Not applicable. STP has no in-scope aluminum components exposed to raw water in the fire protection system, so the applicable NUREG-1801 line was not used.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.63	Steel fire rated doors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to Wear	Fire Protection (B2.1.12)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12)
3.3.1.64	Steel piping, piping components, and piping elements exposed to fuel oil	Loss of material due to general, pitting, and crevice corrosion	Fire Protection (B2.1.12) and Fuel Oil Chemistry (B2.1.14)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12), Fuel Oil Chemistry (B2.1.14)
3.3.1.65	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – indoor uncontrolled	Concrete cracking and spalling due to aggressive chemical attack, and reaction with aggregates	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.66	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor	Concrete cracking and spalling due to freeze thaw, aggressive chemical attack, and reaction with aggregates	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12)
3.3.1.67	Reinforced concrete structural fire barriers – walls, ceilings and floors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to corrosion of embedded steel	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Protection (B2.1.12)
3.3.1.68	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System (B2.1.13)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Water System (B2.1.13)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.69	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Fire Water System (B2.1.13)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Water System (B2.1.13)
3.3.1.70	Copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Fire Water System (B2.1.13)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Fire Water System (B2.1.13)
3.3.1.71	Steel piping, piping components, and piping elements exposed to moist air or condensation (Internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.72	Steel HVAC ducting and components internal surfaces exposed to condensation (Internal)	Loss of material due to general, pitting, crevice, and (for drip pans and drain lines) microbiologically influenced corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
3.3.1.73	Steel crane structural girders in load handling system exposed to air-indoor uncontrolled (external)	Loss of material due to general corrosion	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	No	Consistent with NUREG-1801.
3.3.1.74	Steel cranes - rails exposed to air – indoor uncontrolled (external)	Loss of material due to Wear	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	No	Consistent with NUREG-1801.
3.3.1.75	Elastomer seals and components exposed to raw water	Hardening and loss of strength due to elastomer degradation; loss of material due to erosion	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope elastomer components exposed to raw water in the open-cycle cooling water systems, so the applicable NUREG-1801 lines were not used.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.76	Steel piping, piping components, and piping elements (without lining/coating or with degraded lining/coating) exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically influenced corrosion, fouling, and lining/coating degradation	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 for all components except that a different aging management program is credited for the following. The aging of internal component surfaces exposed to the raw water environment of the liquid radioactive waste, equip drains, essential spray pond makeup and nonradioactive waste systems is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22). The aging of external component surfaces exposed to the raw water environment of the essential cooling pond makeup and nonradioactive waste system sumps and drains is managed by External Surfaces Monitoring (B2.1.20) program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.77	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Open-Cycle Cooling Water System (B2.1.9)
3.3.1.78	Stainless steel, nickel alloy, and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 for all components except that a different aging management program is credited for components exposed to the raw water environment in the solid radioactive waste system. The aging of internal component surfaces exposed to the raw water environment of the solid radioactive waste system is managed by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.79	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting and crevice corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 for all components except that a different aging management program is credited for the following. The aging of internal component surfaces exposed to the raw water environment of the liquid radioactive waste, equipment drain, essential cooling pond makeup and nonradioactive waste systems is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22). The aging of external component surfaces exposed to the raw water environment of nonradioactive waste system sumps and drains that may contain oil and other contaminants is managed by External Surfaces Monitoring program (B2.1.20).

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.80	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Open-Cycle Cooling Water System (B2.1.9)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.81	Copper alloy piping, piping components, and piping elements, exposed to raw water	Loss of material due to pitting, crevice, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 for all components except that a different aging management program is credited for components exposed to the raw water environment in the liquid radioactive waste and essential cooling pond makeup systems. The aging of internal component surfaces exposed to the raw water environment of the liquid radioactive waste and essential cooling pond makeup system is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) aging management program.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.82	Copper alloy heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Open-Cycle Cooling Water System (B2.1.9)
3.3.1.83	Stainless steel and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Open-Cycle Cooling Water System (B2.1.9)

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.84	Copper alloy >15% Zn piping, piping components, piping elements, and heat exchanger components exposed to raw water, treated water, or closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Consistent with NUREG-1801 with aging management program exceptions for SSCs fabricated of brass (Copper alloy >15 percent Zinc). The aging management program(s) with exceptions to NUREG-1801 include: Selective Leaching of Materials (B2.1.17). A plant-specific aging management program Selective Leaching of Aluminum Bronze (B2.1.37) manages the aging of aluminum bronze (copper alloy >8 percent aluminum) because STP has experienced selective leaching of aluminum bronze components.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.85	Gray cast iron piping, piping components, and piping elements exposed to soil, raw water, treated water, or closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Selective Leaching of Materials (B2.1.17)
3.3.1.86	Structural steel (new fuel storage rack assembly) exposed to air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801.
3.3.1.87	Boraflex spent fuel storage racks neutron-absorbing sheets exposed to treated borated water	Reduction of neutron-absorbing capacity due to boraflex degradation	Boraflex Monitoring	No	Not applicable. STP takes no credit for the Spent Fuel Rack Boraflex Neutron Absorber in Region 1 of the Spent Fuel Pool. Soluble boron is credited to provide safety margin by maintaining k_{eff} <.0.95 including uncertainties, tolerances, and accident conditions in the presence of spent fuel pool soluble boron as discussed in UFSAR 9.1.2.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.88	Aluminum and copper alloy >15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Not applicable. STP has no in-scope aluminum or copper alloy > 15 percent Zn piping, piping components, or piping elements exposed to air with borated water leakage in the auxiliary systems, so the applicable NUREG-1801 lines were not used.
3.3.1.89	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Consistent with NUREG-1801.
3.3.1.90	Stainless steel and steel with stainless steel cladding piping, piping components, piping elements, tanks, and fuel storage racks exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.91	Stainless steel and steel with stainless steel cladding piping, piping components, and piping elements exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.
3.3.1.92	Galvanized steel piping, piping components, and piping elements exposed to air – indoor uncontrolled	None	None	NA	Consistent with NUREG-1801.
3.3.1.93	Glass piping elements exposed to air, air – indoor uncontrolled (external), fuel oil, lubricating oil, raw water, treated water, and treated borated water	None	None	NA	Consistent with NUREG-1801.
3.3.1.94	Stainless steel and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA	Consistent with NUREG-1801.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.95	Steel and aluminum piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA	Consistent with NUREG-1801.
3.3.1.96	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA	Consistent with NUREG-1801.
3.3.1.97	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA	Consistent with NUREG-1801.
3.3.1.98	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air	None	None	NA	Consistent with NUREG-1801.

Table 3.3.1 Summary of Aging Management Evaluations in Chapter VII of NUREG-1801 for Auxiliary Systems (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.99	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA	Consistent with NUREG-1801.

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blank Flange	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Blank Flange	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2
Closure Bolting	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2
Crane	SS	Carbon Steel	Plant Indoor Air (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VII.B-2	3.3.1.01	A
Crane	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-3	3.3.1.73	A
Crane	SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Crane	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2
Elevator	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fuel Handling Equip	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Fuel Handling Equip	SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Fuel Handling Equip	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2
Fuel Storage Racks	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	VII.A1-1	3.3.1.86	A
Fuel Storage Racks	SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Fuel Storage Racks	SS	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2
Fuel Storage Racks	SS	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-7	3.3.1.90	E, 2
Load Test Fixture	SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Piping	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2

Table 3.3.2-1 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A2-1	3.3.1.91	E, 2

Notes for Table 3.3.2-1:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Filter	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Filter	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 4
Flow Element	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 4
Flow Element	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Flow Element	SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 4
Flow Element	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Heat Exchanger (Spent Fuel Pool)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.A3-3	3.3.1.48	B

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Spent Fuel Pool)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (Spent Fuel Pool)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-3	3.3.1.52	B
Heat Exchanger (Spent Fuel Pool)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (Spent Fuel Pool)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Heat Exchanger (Spent Fuel Pool)	HT	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (Spent Fuel Pool)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Reduction of heat transfer	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Heat Exchanger (Spent Fuel Pool)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Heat Exchanger (Spent Fuel Pool)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Orifice	PB, TH	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	DF	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Piping	DF	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Piping	DF, LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Piping	DF, LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Pump	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Pump	SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 4

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 4
Pump	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Pump	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Strainer	FIL	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Strainer	FIL	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Strainer	FIL	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Strainer	FIL	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Thermowell	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A

Table 3.3.2-2 Auxiliary Systems – Summary of Aging Management Evaluation – Spent Fuel Pool Cooling and Cleanup System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Tubing	LBS, PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Tubing	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-8	3.3.1.91	E, 3, 4
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.A3-10	3.3.1.90	E, 3, 4

Notes for Table 3.3.2-2:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
- G Environment not in NUREG-1801 for this component and material.
- H Aging effect not in NUREG-1801 for this component, material and environment combination.

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 Reduction in heat transfer due to fouling is a potential aging effect/mechanism for stainless steel heat exchanger components in treated borated water. This non-NUREG-1801 line is based upon the component, material, aging effects and aging management program combination of NUREG-1801, line V.A-16.

3 The One-Time Inspection program (B2.1.16) verifies the effectiveness of the Water Chemistry program (B2.1.2) in managing the aging of stainless steel components exposed to treated borated water.

4 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.3.2-3 Auxiliary Systems – Summary of Aging Management Evaluation – Cranes and Hoists

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Crane	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-3	3.3.1.73	A
Cranes - Rails	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-1	3.3.1.74	A
Cranes - Rails	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-3	3.3.1.73	C
Hoist	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-3	3.3.1.73	A
Trolley	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (B2.1.11)	VII.B-3	3.3.1.73	A

Notes for Table 3.3.2-3:

Standard Notes:

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

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

Plant Specific Notes:

None

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB, SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.C1-18	3.3.1.19	D
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS, PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	F, 1
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Expansion Joint	PB	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VIII.I-9	3.4.1.41	A
Expansion Joint	PB	Nickel Alloys	Raw Water (Both)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	None	None	H
Expansion Joint	PB	Nickel Alloys	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-13	3.3.1.78	B
Filter	FIL, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Filter	FIL, PB	Carbon Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-19	3.3.1.76	B
Flow Element	PB	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VII.J-14	3.3.1.94	A
Flow Element	PB	Nickel Alloys	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-13	3.3.1.78	B

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flow Element	PB	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Heat Exchanger (CCW Pump Room)	HT	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	C
Heat Exchanger (CCW Pump Room)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Heat Exchanger (CCW Pump Room)	PB	Carbon Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-5	3.3.1.77	B
Heat Exchanger (CCW Pump Room)	HT, PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Heat Exchanger (CCW Pump Room)	HT, PB	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-3	3.3.1.82	B

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CCW Pump Room)	HT, PB	Copper Alloy	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-6	3.3.1.83	B
Heat Exchanger (CCW Pump Room)	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Heat Exchanger (CCW Pump Room)	PB	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Orifice	PB, TH	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Piping	PB	Copper Alloy	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	None	None	G
Piping	LBS, PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Piping	LBS, PB, SIA	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Piping	LBS, PB, SIA	Copper Alloy (Aluminum > 8%)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Piping	LBS, PB, SIA	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Selective Leaching of Aluminum Bronze (B2.1.37)	VII.C1-10	3.3.1.84	E, 3
Piping	SIA	Ductile Iron	Buried (Ext)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.C1-12	3.3.1.85	B
Piping	SIA	Ductile Iron	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.C1-11	3.3.1.85	B
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Pump	PB	Copper Alloy (Aluminum > 8%)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Pump	PB	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Pump	PB	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Selective Leaching of Aluminum Bronze (B2.1.37)	VII.C1-10	3.3.1.84	E, 3
Strainer	PB	Carbon Steel clad with Copper-Nickel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	F, 2

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer	PB	Carbon Steel clad with Copper-Nickel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	None	None	F, 2
Strainer Element	FIL	Stainless Steel	Raw Water (Ext)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Strainer Element	FIL	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Thermowell	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Thermowell	PB	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Thermowell	PB	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VII.J-14	3.3.1.94	A
Thermowell	PB	Nickel Alloys	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-13	3.3.1.78	B
Thermowell	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Thermowell	PB	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Traveling Screen	FIL	Stainless Steel	Raw Water (Ext)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	D
Tubing	LBS, PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Tubing	LBS, PB, SIA	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B
Valve	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	PB	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Valve	PB	Copper Alloy (Aluminum > 8%)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	PB	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Valve	PB	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Selective Leaching of Aluminum Bronze (B2.1.37)	VII.C1-10	3.3.1.84	E, 3
Valve	PB	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VII.J-14	3.3.1.94	A
Valve	PB	Nickel Alloys	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-13	3.3.1.78	B
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B

Table 3.3.2-4 Auxiliary Systems – Summary of Aging Management Evaluation – Essential Cooling Water and ECW Screen Wash System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel Cast Austenitic	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-15	3.3.1.79	B

Notes for Table 3.3.2-4:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

F Material not in NUREG-1801 for this component.

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 Carbon steel clad with copper-nickel is not a material addressed in NUREG-1801. The External Surfaces Monitoring Program (B2.1.20) manages the aging of the exterior carbon steel surfaces of this material that are exposed to Plant Indoor Air (External). The Open-Cycle Cooling Water program (B2.1.9) manages the aging of the copper-nickel clad surfaces of this material that are exposed to raw water.

3 Loss of material by selective leaching is managed by the Selective Leaching of Aluminum Bronze program (B2.1.37) instead of the Selective Leaching of Materials program (B2.1.17) for components made of aluminum bronze (copper alloy > 8 percent aluminum).

Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Makeup Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flow Element	PB	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Orifice	LBS, PB, TH	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Orifice	LBS, PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Piping	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Piping	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Pump	PB	Stainless Steel Cast Austenitic	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Pump	PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A

Table 3.3.2-5 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Makeup Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	PB	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tank	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tank	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tubing	LBS, PB	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tubing	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	LBS, SIA	Stainless Steel Cast Austenitic	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A

Notes for Table 3.3.2-5:

Standard Notes:

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flexible Hoses	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flow Element	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Flow Element	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Heat Exchanger (CCW Heat Exchanger)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (CCW Heat Exchanger)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (CCW Heat Exchanger)	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-4	3.3.1.51	D

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CCW Heat Exchanger)	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Heat Exchanger (CCW Heat Exchanger)	PB	Copper Alloy	Raw Water (Ext)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	D
Heat Exchanger (CCW Heat Exchanger)	PB	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-3	3.3.1.82	B
Heat Exchanger (CCW Heat Exchanger)	HT, PB	Titanium	Closed Cycle Cooling Water (Ext)	None	None	None	None	F
Heat Exchanger (CCW Heat Exchanger)	HT, PB	Titanium	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.9)	None	None	F
Heat Exchanger (Chg Pump Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-2	3.3.1.52	B

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Chg Pump Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-4	3.3.1.51	B
Heat Exchanger (Chg Pump Room)	HT, PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Carbon Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	D
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Copper Alloy	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-4	3.3.1.51	D

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-4	3.3.1.51	D
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Copper Alloy	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-5	3.3.1.26	D
Heat Exchanger (RCP Bearing Oil Cooler)	PB	Copper Alloy	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-5	3.3.1.26	D
Heat Exchanger (RCP Motor Air Cooler)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (RCP Motor Air Cooler)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (RCP Motor Air Cooler)	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-4	3.3.1.51	D
Heat Exchanger (RCP Motor Air Cooler)	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RCP Thermal Barrier Cooler)	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Heat Exchanger (RCP Thermal Barrier Cooler)	PB	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (RCP Thermal Barrier Cooler)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Orifice	PB, TH	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Piping	LBS, PB, SIA	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Piping	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	LBS, PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Pump	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	LBS, PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Sight Gauge	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	LBS, SIA	Glass	Closed Cycle Cooling Water (Int)	None	None	VII.J-13	3.3.1.93	A
Sight Gauge	LBS, SIA	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Tank	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Tank	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Tubing	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B

Table 3.3.2-6 Auxiliary Systems – Summary of Aging Management Evaluation – Component Cooling Water System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Valve	PB	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Valve	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Notes for Table 3.3.2-6:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

F Material not in NUREG-1801 for this component.

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Accumulator	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Compressor	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Compressor	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Compressor	LBS	Cast Iron	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Compressor	LBS	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Filter	FIL, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Filter	FIL, PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2
Heat Exchanger (Air)	HT, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (Air)	HT, PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (BA Compressor Pkg Lube Oil)	LBS	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-22	3.3.1.14	B
Heat Exchanger (BA Compressor Pkg Lube Oil)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.G-5	3.3.1.59	B
Piping	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Piping	LBS	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-22	3.3.1.14	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.D-3	3.3.1.57	B
Piping	PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Piping	PB, SIA	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB, SIA	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2
Solenoid Valve	PB	Copper Alloy (> 15% Zinc)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Solenoid Valve	PB	Copper Alloy (> 15% Zinc)	Plant Indoor Air (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	None	None	G, 3
Tank	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Tank	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2
Valve	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Valve	LBS	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.G-22	3.3.1.14	B
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Cast Iron	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B
Valve	PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	PB, SIA	Copper Alloy	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-9	3.3.1.28	E
Valve	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-2	3.3.1.53	E, 2
Valve	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2

Table 3.3.2-7 Auxiliary Systems – Summary of Aging Management Evaluation – Compressed Air System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.D-4	3.3.1.54	E, 2

<u>Notes for Table 3.3.2-7:</u>

<u>Standard Notes:</u>

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
G Environment not in NUREG-1801 for this component and material.
H Aging effect not in NUREG-1801 for this component, material, and environment combination.

<u>Plant Specific Notes:</u>

1 Loss of preload is conservatively considered to be applicable for all closure bolting.
2 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) is used in lieu of NUREG-1801, Section XI.M24, Compressed Air Monitoring because this is an aging effect which occurs on the internal surfaces of these components.
3 Non-inhibited copper alloy > 15 percent zinc SSCs with surfaces exposed to ventilation atmosphere (internal) or plant indoor air (internal) are subject to wetting due to condensation and thus are subject to loss of material due to selective leaching.

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Filter	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Filter	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	C
Filter	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Filter	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Flow Element	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Flow Element	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	C
Flow Element	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Flow Element	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Heat Exchanger (PASS Cont Sump Sample)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (PASS Cont Sump Sample)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (PASS Cont Sump Sample)	LBS	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VIII.E-2	3.4.1.25	B
Heat Exchanger (PASS Cont Sump Sample)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Heat Exchanger (PASS RCS Sample)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (PASS RCS Sample)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (PASS RCS Sample)	LBS	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VIII.E-2	3.4.1.25	B

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (PASS RCS Sample)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Heat Exchanger (PASS RHR Sample)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (PASS RHR Sample)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (PASS RHR Sample)	LBS	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VIII.E-2	3.4.1.25	B
Heat Exchanger (PASS RHR Sample)	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Heat Exchanger (PASS Spare Sample)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (PASS Spare Sample)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Piping	LBS, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 1
Pump	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Pump	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Pump	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	C
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Pump	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Solenoid Valve	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Solenoid Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 1
Tank	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Tank	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	C
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Tank	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Tubing	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Tubing	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VIII.E-24	3.4.1.25	B
Valve	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A

Table 3.3.2-8 Auxiliary Systems – Summary of Aging Management Evaluation – Primary Process Sampling System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 1
Valve	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 1

Notes for Table 3.3.2-8:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Compressor	PB	Cast Iron	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Compressor	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Eductor	PB	Copper Alloy (> 15% Zinc)	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-5	3.3.1.26	B
Eductor	PB	Copper Alloy (> 15% Zinc)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Filter	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B
Filter	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Flow Element	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Flow Element	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	LBS	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Flow Element	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Heat Exchanger (AHU Condenser)	PB	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Heat Exchanger (AHU Condenser)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (AHU Condenser)	HT, PB	Titanium	Dry Gas (Ext)	None	None	None	None	F
Heat Exchanger (AHU Condenser)	HT, PB	Titanium	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.9)	None	None	F
Heat Exchanger (AHU Evaporator)	PB	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Heat Exchanger (AHU Evaporator)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (AHU Evaporator)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (AHU Evaporator)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (AHU Evaporator)	HT, PB	Copper Alloy	Dry Gas (Ext)	None	None	VII.J-4	3.3.1.97	A

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Lube Oil Cooler)	HT, PB	Stainless Steel	Dry Gas (Ext)	None	None	VII.J-19	3.3.1.97	A
Heat Exchanger (Lube Oil Cooler)	HT, PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-12	3.3.1.33	B
Heat Exchanger (Lube Oil Cooler)	HT, PB	Stainless Steel	Lubricating Oil (Int)	Reduction of heat transfer	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-12	3.4.1.10	B
Piping	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Piping	LBS, PB, SIA	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Piping	PB, SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Piping	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS, PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS	Cast Iron	Closed Cycle Cooling Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.C2-8	3.3.1.85	B
Pump	LBS	Cast Iron	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Pump	PB	Cast Iron	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B
Pump	LBS, PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Separator	PB	Stainless Steel	Dry Gas (Ext)	None	None	VII.J-19	3.3.1.97	A
Separator	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Separator	PB	Stainless Steel	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-12	3.3.1.33	B
Sight Gauge	LBS, PB	Glass	Closed Cycle Cooling Water (Int)	None	None	VII.J-13	3.3.1.93	A

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Gauge	LBS, PB	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Strainer	LBS	Carbon Steel (Galvanized)	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Strainer	LBS	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	A
Tank	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Tank	LBS, PB	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Tank	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B
Tank	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Tank	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-12	3.3.1.33	B
Tank	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Thermowell	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	LBS, PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Tubing	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Tubing	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-12	3.3.1.33	B
Tubing	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Valve	LBS, PB, SIA	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Valve	LBS, PB, SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-13	3.3.1.14	B

Table 3.3.2-9 Auxiliary Systems – Summary of Aging Management Evaluation – Chilled Water HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS	Copper Alloy (> 15% Zinc)	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Valve	LBS	Copper Alloy (> 15% Zinc)	Closed Cycle Cooling Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.F2-15	3.3.1.84	B
Valve	PB	Copper Alloy (> 15% Zinc)	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Valve	PB	Copper Alloy (> 15% Zinc)	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.C2-5	3.3.1.26	B
Valve	LBS, PB	Copper Alloy (> 15% Zinc)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS, PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Valve	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A
Valve	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Notes for Table 3.3.2-9:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- F Material not in NUREG-1801 for this component.

Plant Specific Notes:

None

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Air Handler	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-2	3.3.1.56	B
Air Handler	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Air Handler	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Air Handler	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-2	3.3.1.56	B
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-4	3.3.1.55	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-4	3.3.1.55	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	PB	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Damper	FB, PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Damper	FB, PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-2	3.3.1.56	B
Ductwork	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Ductwork	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Ductwork	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	LBS, PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Ductwork	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Ductwork	LBS	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	D
Ductwork	LBS	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	D
Ductwork	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	LBS	Stainless Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Ductwork	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Ductwork	LBS, PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Filter	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Filter	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Filter	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Filter	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-5	3.3.1.34	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F1-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-5	3.3.1.34	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F2-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-6	3.3.1.34	E

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-6	3.3.1.34	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-7	3.3.1.11	E
Flow Element	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Flow Element	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Flow Element	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Computer Room AHU)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (Computer Room AHU)	LBS	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Control Room AHU Cooling Coil)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F1-8	3.3.1.51	B
Heat Exchanger (Control Room AHU Cooling Coil)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F1-12	3.3.1.52	B
Heat Exchanger (Control Room AHU Cooling Coil)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-16	3.3.1.25	E

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Cooling Coils Fins)	HT	Aluminum	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-14	3.3.1.27	E
Heat Exchanger (Cooling Coils Fins)	HT	Aluminum	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-12	3.3.1.27	E
Heat Exchanger (Cooling Coils Frame)	SS	Stainless Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Heat Exchanger (Cooling Coils Frame)	SS	Stainless Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Heat Exchanger (Cooling Coils Frame)	SS	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Cooling Coils Frame)	SS	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Heat Exchanger (EAB Main AHU)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (EAB Main AHU)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (EAB Main AHU)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Elec Penetration Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (Elec Penetration Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Elec Penetration Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Pen Space AHU Cooling Coil)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (Pen Space AHU Cooling Coil)	LBS	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heater	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Heater	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Heater	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heater	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Heater	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Piping	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F1-11	3.3.1.48	B
Piping	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-18	3.3.1.47	B
Piping	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-2	3.3.1.56	B
Piping	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Piping	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	D
Piping	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	D

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Piping	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Piping	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Piping	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Silencer	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C

Table 3.3.2-10 Auxiliary Systems – Summary of Aging Management Evaluation – Electrical Auxiliary Building and Control Room HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Silencer	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B
Tubing	PB	Copper Alloy	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-16	3.3.1.25	E
Tubing	PB	Copper Alloy	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-14	3.3.1.25	E
Tubing	PB	Copper Alloy	Ventilation Atmosphere (Int)	None	None	None	None	G
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Tubing	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E

Notes for Table 3.3.2-10:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Air Handler	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Air Handler	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-4	3.3.1.55	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-7	3.3.1.55	B
Damper	PB	Carbon Steel	Atmosphere/ Weather (Int)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper	PB	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Damper	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Damper	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Damper	FB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Damper	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	A
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	LBS, PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	A
Ductwork	LBS	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Ductwork	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Filter	PB	Carbon Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Filter	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Filter	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	A

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-5	3.3.1.34	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F2-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-6	3.3.1.34	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-7	3.3.1.11	E
Heat Exchanger (ESF Equipment Room AHU)	HT	Aluminum	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-12	3.3.1.27	E

Table 3.3.2-11 Auxiliary Systems – Summary of Aging Management Evaluation – Fuel Handling Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (ESF Equipment Room AHU)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (ESF Equipment Room AHU)	HT, LBS, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (ESF Equipment Room AHU)	HT, LBS, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (ESF Equipment Room AHU)	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Heat Exchanger (ESF Equipment Room AHU)	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E

Notes for Table 3.3.2-11:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

None

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blower	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Blower	PB, SIA	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Damper	PB	Carbon Steel	Atmosphere/ Weather (Int)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Damper	PB	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Damper	FB, PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Damper	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper	FB	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Ductwork	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Ductwork	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Ductwork	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-5	3.3.1.34	E
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F2-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-6	3.3.1.34	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-7	3.3.1.11	E
Heat Exchanger (Aux Bldg HVAC)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Aux Bldg HVAC)	LBS	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (BA Transfer Pump Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (BA Transfer Pump Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (BA Transfer Pump Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Charging Pump Valve Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (Charging Pump Valve Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Charging Pump Valve Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Chemistry Counting Room)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (Chemistry Counting Room)	LBS	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (CVCS Valve Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (CVCS Valve Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (CVCS Valve Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Essential Chillers Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (Essential Chillers Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (Essential Chillers Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Locker Room & Office Area AHU)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (Locker Room & Office Area AHU)	LBS	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Rad Mon Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Rad Mon Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (Rad Mon Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Heat Exchanger (Rad Waste Control Room)	LBS, PB, SIA	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (Rad Waste Control Room)	LBS, PB, SIA	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (Rad Waste Control Room)	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	B
Heat Exchanger (Rad Waste Control Room)	LBS, PB, SIA	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E

Table 3.3.2-12 Auxiliary Systems – Summary of Aging Management Evaluation – Mechanical Auxiliary Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RMW Storage Tank Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-10	3.3.1.52	B
Heat Exchanger (RMW Storage Tank Room)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F2-13	3.3.1.51	D
Heat Exchanger (RMW Storage Tank Room)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-14	3.3.1.25	E
Piping	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	D
Piping	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Piping	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Ext)	None	None	None	None	F, 1
Piping	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Int)	None	None	None	None	F, 1

Notes for Table 3.3.2-12:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
- F Material not in NUREG-1801 for this component.

Plant Specific Notes:

1 PVC is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils, and ozone.

Table 3.3.2-13 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous HVAC Systems (In Scope)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B, 1
Damper	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F2-2	3.3.1.56	B
Damper	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Damper	FB, PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-13 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous HVAC Systems (In Scope) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F2-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-7	3.3.1.11	E

Notes for Table 3.3.2-13:

Standard Notes:

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blower	PB	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	PB	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
CRDM Cooling Shroud	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	B
CRDM Cooling Shroud	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper	FB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Damper	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Damper	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	B
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Ductwork	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	B
Ductwork	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Ductwork	PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Ductwork	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Ductwork	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Filter	PB	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Filter	FIL	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	B
Filter	FIL	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Filter	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	None	None	VII.J-6	3.3.1.92	C
Filter	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-5	3.3.1.34	E

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F3-7	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-6	3.3.1.34	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-7	3.3.1.11	E
Heat Exchanger (Reactor Containment Fan Cooler)	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-10	3.3.1.59	B
Heat Exchanger (Reactor Containment Fan Cooler)	PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	D
Heat Exchanger (Reactor Containment Fan Cooler)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.F3-8	3.3.1.51	B

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Reactor Containment Fan Cooler)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.F3-12	3.3.1.52	B
Heat Exchanger (Reactor Containment Fan Cooler)	HT, PB	Copper Alloy	Ventilation Atmosphere (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-16	3.3.1.25	E
Piping	PB, SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Piping	PB	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	D

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB, SIA	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Piping	LBS	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	D
Piping	SIA	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	D
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-1	3.3.1.27	E
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F3-2	3.3.1.56	D

Table 3.3.2-14 Auxiliary Systems – Summary of Aging Management Evaluation – Reactor Containment Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	D
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-1	3.3.1.27	E

Notes for Table 3.3.2-14:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Building HVAC System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Blower	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F4-1	3.3.1.56	B
Blower	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F4-2	3.3.1.72	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B, 1
Damper	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F4-1	3.3.1.56	B
Damper	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F4-2	3.3.1.72	B
Damper	FB, PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F4-2	3.3.1.72	B
Damper	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C

Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Damper	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Ductwork	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F4-1	3.3.1.56	B
Ductwork	PB	Carbon Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F4-2	3.3.1.72	B
Flex Connectors	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F4-6	3.3.1.11	E
Flex Connectors	PB	Elastomer	Ventilation Atmosphere (Int)	Hardening and loss of strength	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F4-6	3.3.1.11	E
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-15 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Building HVAC System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	Ventilation Atmosphere (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E

Notes for Table 3.3.2-15:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Hydrogen Monitoring and Combustible Gas Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flow Indicator	PB	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Flow Indicator	PB	Glass	Plant Indoor Air (Int)	None	None	VII.J-7	3.3.1.93	A
Heat Exchanger (Hydrogen Analyzer)	HT, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Heat Exchanger (Hydrogen Analyzer)	HT, PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Pump	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G

Table 3.3.2-16 Auxiliary Systems – Summary of Aging Management Evaluation – Containment Hydrogen Monitoring and Combustible Gas Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G

Notes for Table 3.3.2-16:

Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
G Environment not in NUREG-1801 for this component and material.
H Aging effect not in NUREG-1801 for this component, material, and environment combination.

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-1	3.3.1.43	B
Closure Bolting	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.G-25	3.3.1.19	B
Closure Bolting	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Damper	FB, PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Damper	FB, PB	Carbon Steel (Galvanized)	Ventilation Atmosphere (Int)	None	None	VII.J-6	3.3.1.92	A
Filter (Halon)	PB	Aluminum	Dry Gas (Int)	None	None	VII.J-2	3.3.1.97	A
Filter (Halon)	PB	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	A
Filter (Halon)	FIL	Copper Alloy	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Filter (Halon)	FIL	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Flame Arrestor	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fire Protection (B2.1.12) and Fuel Oil Chemistry (B2.1.14)	VII.G-21	3.3.1.64	B
Flame Arrestor	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Flow Element	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Flow Element	PB	Carbon Steel (Galvanized)	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Heat Exchanger (DFP Jacket Water)	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	V.A-5	3.2.1.29	B
Heat Exchanger (DFP Jacket Water)	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	V.A-11	3.2.1.30	B
Heat Exchanger (DFP Jacket Water)	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (DFP Jacket Water)	PB	Copper Alloy	Raw Water (Ext)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Heat Exchanger (DFP Jacket Water)	PB	Copper Alloy	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Hydrant	PB	Cast Iron (Gray Cast Iron)	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Hydrant	PB	Cast Iron (Gray Cast Iron)	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.G-14	3.3.1.85	B
Hydrant	PB	Cast Iron (Gray Cast Iron)	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Orifice	PB, TH	Stainless Steel	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-19	3.3.1.69	B
Piping	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Piping (Halon)	PB	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Piping (Halon)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.I-8	3.3.1.58	E, 2
Piping	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	PB, SIA	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Piping	LBS, PB, SIA, SP	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	PB, SP	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B
Piping	LBS, PB, SIA	Carbon Steel (Galvanized)	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Piping	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Cast Iron	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Piping	PB	Ductile Iron	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.G-25	3.3.1.19	B
Piping	PB	Ductile Iron	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Piping	PB	Stainless Steel	Diesel Exhaust (Int)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-1	3.3.1.06	E
Piping	PB	Stainless Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Piping (Halon)	SP	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Piping (Halon)	SP	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	PB	Cast Iron	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Solenoid Valve	PB	Copper Alloy	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Solenoid Valve (Halon)	PB	Copper Alloy	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Solenoid Valve (Halon)	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Solenoid Valve	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Solenoid Valve	PB	Copper Alloy	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-9	3.3.1.28	E
Solenoid Valve	PB	Copper Alloy	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Sprinkler	PB, SP	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Sprinkler	PB, SP	Copper Alloy	Raw Water (Internal)	Loss of material	Fire Water Systems (B2.1.13)	VII.G-12	3.3.1.70	B
Strainer	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Strainer	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer	PB, SIA	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Strainer	PB, SIA	Cast Iron	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Strainer Element	FIL	Copper Alloy	Raw Water (Ext)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Strainer Element	FIL	Copper Alloy	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Tank	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Tank	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B
Tank	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	PB	Carbon Steel	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Tubing	PB	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tubing	PB	Stainless Steel	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-19	3.3.1.69	B
Valve (Halon)	PB	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve (Halon)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.I-8	3.3.1.58	E, 2
Valve	PB	Carbon Steel	Fuel Oil (Int)	None	None	V.F-2	3.2.1.50	A
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Carbon Steel	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Valve	PB	Cast Iron	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Valve	PB	Cast Iron	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.G-25	3.3.1.19	B
Valve	PB, SIA	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB, SIA	Cast Iron	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Cast Iron (Gray Cast Iron)	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Valve	PB	Cast Iron (Gray Cast Iron)	Buried (Ext)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.G-15	3.3.1.85	B
Valve	PB	Cast Iron (Gray Cast Iron)	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.G-25	3.3.1.19	B
Valve	SIA	Cast Iron (Gray Cast Iron)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Valve	PB	Cast Iron (Gray Cast Iron)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Valve	PB	Cast Iron (Gray Cast Iron)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	F
Valve	PB, SIA	Cast Iron (Gray Cast Iron)	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.G-14	3.3.1.85	B
Valve	PB, SIA	Cast Iron (Gray Cast Iron)	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-24	3.3.1.68	B
Valve	PB	Copper Alloy	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G

Table 3.3.2-17 Auxiliary Systems – Summary of Aging Management Evaluation – Fire Protection System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve (Halon)	PB	Copper Alloy	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Valve (Halon)	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	PB	Copper Alloy	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-9	3.3.1.28	E
Valve	PB, SIA	Copper Alloy	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-12	3.3.1.70	B
Valve (Halon)	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve (Halon)	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Raw Water (Int)	Loss of material	Fire Water System (B2.1.13)	VII.G-19	3.3.1.69	B

Notes for Table 3.3.2-17:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

F Material not in NUREG-1801 for this component.

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The Fire Protection program (B2.1.12) is used to manage aging of the external surfaces of halon piping.

Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Filter	FIL, PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Filter	FIL, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Flame Arrestor	PB	Aluminum	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	J
Flame Arrestor	PB	Aluminum	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-7	3.3.1.32	D
Flexible Hoses	PB	Elastomer	Fuel Oil (Int)	None	None	None	None	G
Flexible Hoses	PB	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	External Surfaces Monitoring Program (B2.1.20)	VII.F4-6	3.3.1.11	E

Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H1-8	3.3.1.60	B
Piping	LBS, SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.H1-9	3.3.1.19	B
Piping	LBS, PB, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS, PB, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Pump	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	LBS, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Sight Gauge	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Strainer	FIL, LBS, PB, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B

Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer	FIL, LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	LBS, PB, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Tank	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tubing	SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tubing	SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Valve	LBS, PB, SIA	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	B
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Copper Alloy	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-3	3.3.1.32	B

Table 3.3.2-18 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator Fuel Oil Storage and Transfer System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS, PB, SIA	Stainless Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-6	3.3.1.32	B
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Notes for Table 3.3.2-18:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

Plant Specific Notes:

None

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Accumulator	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Bellows	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Bellows	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Chiller	LBS, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Chiller	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Chiller	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	C
Class 1 Piping <= 4in	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Class 1 Piping <= 4in	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2) and One-Time Inspection of ASME Code Class 1 Small-Bore Piping (B2.1.19)	IV.C2-1	3.1.1.70	B
Class 1 Piping <= 4in	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS, PB	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Demineralizer	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Demineralizer	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-19	3.3.1.14	B
Filter	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Filter	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Filter	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Filter	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Flexible Hoses	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Flexible Hoses	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Flexible Hoses	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Flexible Hoses	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A, 2
Flow Element	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Flow Element	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Flow Element	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Flow Element	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Flow Indicator	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Flow Indicator	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Nickel-Alloys	Borated Water Leakage (Ext)	None	None	None	None	G, 1
Heat Exchanger (Conc Boric Acid Sample Clr)	LBS	Nickel-Alloys	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2)	None	None	G
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Carbon Steel	Demineralized Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.D1-9	3.4.1.29	B
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS BTRS Letdown Chiller)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS BTRS Letdown Reheat)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CVCS BTRS Letdown Reheat)	PB	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS BTRS Letdown Reheat)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS BTRS Letdown Reheat)	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS BTRS Letdown Reheat)	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS BTRS Moderating)	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Heat Exchanger (CVCS BTRS Moderating)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS BTRS Moderating)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS Excess Letdown)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (CVCS Excess Letdown)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS Excess Letdown)	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS Letdown)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B
Heat Exchanger (CVCS Letdown)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-9	3.3.1.07	E
Heat Exchanger (CVCS Letdown)	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS Regenerative)	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (CVCS Seal Water Return)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-6	3.3.1.48	B

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Seal Water Return)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (CVCS Seal Water Return)	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-3	3.3.1.52	B
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Ext)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D
Heat Exchanger (CVCS Seal Water Return)	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (CVCS Seal Water Return)	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D
Heat Exchanger (CVCS Seal Water Return)	PB	Stainless Steel	Treated Borated Water (Ext)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS Seal Water Return)	PB	Stainless Steel	Treated Borated Water (Ext)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-5	3.3.1.08	E, 2
Heat Exchanger (CVCS Seal Water Return)	HT, PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Heat Exchanger (Lube Oil Cooler)	LBS	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-19	3.3.1.14	D
Heat Exchanger (Lube Oil Cooler)	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Heat Exchanger (Lube Oil Cooler)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-2	3.3.1.52	B
Heat Exchanger (Lube Oil Cooler)	HT, PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-2	3.3.1.51	B
Heat Exchanger (Lube Oil Cooler)	HT, PB	Copper Alloy	Lubricating Oil (Ext)	Reduction of heat transfer	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	V.A-12	3.2.1.09	B

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (Lube Oil Cooler)	HT, PB	Copper Alloy	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-12	3.3.1.26	D
Heat Exchanger (Lube Oil Cooler)	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (Lube Oil Cooler)	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D
Heat Exchanger (Lube Oil Cooler)	PB	Stainless Steel	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-15	3.3.1.33	D
Heat Exchanger (Lube Oil Cooler)	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-15	3.3.1.33	D
Heat Exchanger (Lube Oil Cooler)	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Insulation	INS	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	C
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	PB, TH	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Orifice	PB, TH	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Piping	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A, 2
Piping	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-19	3.3.1.14	B
Piping	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-16	3.4.1.02	A
Piping	LBS	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.A-17	3.4.1.29	B
Piping	LBS	Copper Alloy	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-12	3.3.1.26	B

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	V.F-3	3.2.1.53	A
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Piping	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-4	3.4.1.16	A
Piping	PB	Stainless Steel	Treated Borated Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VII.E1-16	3.3.1.02	A
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Pump	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	C, 2

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-19	3.3.1.14	D
Pump	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-7	3.3.1.09	E, 2
Pump	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Pump	LBS	Stainless Steel	Zinc Acetate (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G
Strainer	LBS	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.E1-11	3.3.1.51	B
Strainer	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	V.F-3	3.2.1.53	A

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	C, 2
Tank	LBS	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	C
Tank	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Tank	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	C
Tank	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Tank	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tank	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Tank	LBS	Thermoplastics	Plant Indoor Air (Ext)	None	None	None	None	F

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS	Thermoplastics	Zinc Acetate (Int)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	J
Thermowell	PB	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Thermowell	PB	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Tubing	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Valve	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A, 2

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.E1-19	3.3.1.14	B
Valve	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS, SIA	Cast Iron	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Valve	LBS, SIA	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD for Class 1 components (B2.1.1) and Water Chemistry (B2.1.2)	IV.C2-5	3.1.1.68	A

Table 3.3.2-19 Auxiliary Systems – Summary of Aging Management Evaluation – Chemical and Volume Control System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Reactor Coolant (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	IV.C2-15	3.1.1.83	E, 2
Valve	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-4	3.4.1.16	A
Valve	LBS	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-10	3.4.1.39	E, 2
Valve	LBS	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-12	3.4.1.37	E, 2
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 2
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 2
Valve	LBS	Stainless Steel	Zinc Acetate (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G

Notes for Table 3.3.2-19:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

Plant Specific Notes:
1 NUREG-1801 does not address the aging effect of nickel-alloys in borated water leakage. Nickel-alloys subject to an air with borated water leakage environment are similar to stainless steel in a borated water leakage environment and do not experience aging effects due to borated water leakage.
2 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	C
Accumulator	SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Accumulator	PB	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	C
Accumulator	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Blower	HT, PB	Cast Iron	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	D
Blower	PB	Cast Iron	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Blower	HT, PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Blower	PB	Cast Iron	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	D
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Dryer	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Dryer	SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Expansion Joint	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Expansion Joint	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Expansion Joint	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Expansion Joint	PB	Carbon Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-22	3.3.1.76	D
Expansion Joint	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Expansion Joint	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Expansion Joint	PB	Stainless Steel	Diesel Exhaust (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	None	None	H
Expansion Joint	PB	Stainless Steel	Diesel Exhaust (Int)	Cracking	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-1	3.3.1.06	E
Expansion Joint	PB	Stainless Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Expansion Joint	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Expansion Joint	PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	H, 1
Expansion Joint	PB	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-18	3.3.1.80	D
Filter	PB	Aluminum	Dry Gas (Int)	None	None	VII.J-2	3.3.1.97	A
Filter	FIL, PB	Aluminum	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	None	None	G
Filter	FIL, PB	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	A
Filter	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	FIL, PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Filter	FIL, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Filter	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Flexible Hoses	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Flexible Hoses	SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Heat Exchanger (DG Governor Oil Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Reduction of heat transfer	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-3	3.3.1.52	B
Heat Exchanger (DG Governor Oil Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	D
Heat Exchanger (DG Governor Oil Cooler)	HT, PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	D

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (DG Governor Oil Cooler)	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	D
Heat Exchanger (DG Governor Oil Cooler)	HT, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Heat Exchanger (DG Jacket Water)	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	D
Heat Exchanger (DG Jacket Water)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H2-3	3.3.1.59	B
Heat Exchanger (DG Jacket Water)	PB	Carbon Steel	Raw Water (Int)	Loss of material	Open Cycle Cooling Water System (B2.1.9)	VII.H2-22	3.3.1.76	B
Heat Exchanger (DG Jacket Water)	HT, PB	Titanium	Closed Cycle Cooling Water (Ext)	None	None	None	None	F

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (DG Jacket Water)	HT, PB	Titanium	Raw Water (Int)	Reduction of heat transfer	Open Cycle Cooling Water System (B2.1.9)	None	None	F
Heat Exchanger (DG Lube Oil)	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-5	3.3.1.21	B
Heat Exchanger (DG Lube Oil)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H2-3	3.3.1.59	B
Heat Exchanger (DG Lube Oil)	PB	Carbon Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-22	3.3.1.76	D
Heat Exchanger (DG Lube Oil)	HT, PB	Titanium	Lubricating Oil (Ext)	Reduction of heat transfer	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	None	None	F
Heat Exchanger (DG Lube Oil)	HT, PB	Titanium	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.9)	None	None	F
Heat Exchanger (DG Turbo Air Intercooler)	HT	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	A

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (DG Turbo Air Intercooler)	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H2-3	3.3.1.59	B
Heat Exchanger (DG Turbo Air Intercooler)	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Heat Exchanger (DG Turbo Air Intercooler)	HT, PB	Titanium	Closed Cycle Cooling Water (Int)	None	None	None	None	F
Heat Exchanger (DG Turbo Air Intercooler)	HT, PB	Titanium	Plant Indoor Air (Ext)	None	None	None	None	F
Heat Exchanger (DG Turbo Air Intercooler)	HT, PB	Titanium	Raw Water (Int)	Reduction of heat transfer	Open-Cycle Cooling Water System (B2.1.9)	None	None	F
Heater	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	D
Heater	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-5	3.3.1.21	D

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heater	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Orifice	SIA	Aluminum	Dry Gas (Int)	None	None	VII.J-2	3.3.1.97	A
Orifice	SIA	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Orifice	PB, TH	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Orifice	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Orifice	PB, SIA, TH	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Orifice	SIA	Cast Iron	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Orifice	SIA	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Orifice	LBS, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Orifice	LBS, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	B
Orifice	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Piping	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Piping	PB	Carbon Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Piping	LBS, PB, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Piping	PB	Carbon Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-22	3.3.1.76	B
Piping	PB, SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Piping	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	PB	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Pump	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Pump	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	PB	Cast Iron	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Pump	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	PB	Cast Iron	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Sight Gauge	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	PB	Glass	Lubricating Oil (Int)	None	None	VII.J-10	3.3.1.93	A
Sight Gauge	PB	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Silencer	PB	Carbon Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Silencer	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Silencer	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	D
Solenoid Valve	SIA	Copper Alloy	Dry Gas (Int)	None	None	VII.J-3	3.3.1.98	A
Solenoid Valve	PB	Copper Alloy	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Solenoid Valve	PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Strainer	FIL, PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Strainer	FIL, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Strainer	LBS, SIA	Cast Iron	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer	LBS, SIA	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Strainer	FIL	Stainless Steel	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	B
Thermowell	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Thermowell	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Thermowell	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Thermowell	PB	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	B
Thermowell	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	B
Thermowell	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Thermowell	SIA	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Thermowell	PB	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-18	3.3.1.80	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B
Tubing	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tubing	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Tubing	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Tubing	LBS, PB, SIA	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	B
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Tubing	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.H2-18	3.3.1.80	B
Valve	SIA	Aluminum	Dry Gas (Int)	None	None	VII.J-2	3.3.1.97	A
Valve	SIA	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Valve	LBS, PB, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-23	3.3.1.47	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B
Valve	LBS, PB, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Valve	PB	Cast Iron	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve	PB	Cast Iron	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Valve	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB, SIA	Copper Alloy	Dry Gas (Int)	None	None	VII.J-4	3.3.1.97	A
Valve	LBS, PB, SIA	Copper Alloy	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-10	3.3.1.26	B

Table 3.3.2-20 Auxiliary Systems – Summary of Aging Management Evaluation – Standby Diesel Generator and Auxiliaries (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS, SIA	Copper Alloy	Plant Indoor Air (Int)	None	None	None	None	G
Valve	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-10	3.3.1.50	B
Valve	LBS, PB, SIA	Stainless Steel	Closed Cycle Cooling Water (Int)	Cracking	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-11	3.3.1.46	B
Valve	PB, SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve	LBS, PB, SIA	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	B
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G

Notes for Table 3.3.2-20:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- D Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
- F Material not in NUREG-1801 for this component
- G Environment not in NUREG-1801 for this component and material.
- H Aging effect not in NUREG-1801 for this component, material, and environment combination.

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-1	3.3.1.43	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Expansion Joint	PB	Stainless Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Expansion Joint	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flame Arrestor	PB	Aluminum	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-1	3.3.1.32	B
Flame Arrestor	PB	Aluminum	Plant Indoor Air (Ext)	None	None	VII.J-1	3.3.1.95	A
Flame Arrestor	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H1-10	3.3.1.20	D

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flame Arrestor	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Flexible Hoses	PB	Stainless Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-16	3.3.1.32	B
Flexible Hoses	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-17	3.3.1.33	B
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H1-8	3.3.1.60	B
Piping	PB	Carbon Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Piping	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Piping	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Piping	PB	Copper Alloy	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Piping	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-8	3.3.1.51	B
Sight Gauge	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B
Sight Gauge	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Gauge	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	PB	Glass	Fuel Oil (Int)	None	None	VII.J-9	3.3.1.93	A
Sight Gauge	PB	Glass	Lubricating Oil (Int)	None	None	VII.J-10	3.3.1.93	A
Sight Gauge	PB	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Silencer	PB	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	D
Silencer	PB	Carbon Steel	Diesel Exhaust (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-2	3.3.1.18	E
Tank	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B
Tank	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	D

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Tubing	PB	Copper Alloy	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Tubing	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-8	3.3.1.51	B
Tubing	PB	Stainless Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-16	3.3.1.32	B
Tubing	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Carbon Steel	Fuel Oil (Int)	Loss of material	Fuel Oil Chemistry (B2.1.14) and One-Time Inspection (B2.1.16)	VII.H2-24	3.3.1.20	B

Table 3.3.2-21 Auxiliary Systems – Summary of Aging Management Evaluation – Nonsafety-related Diesel Generators and Auxiliary Fuel Oil System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VII.H2-20	3.3.1.14	B
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.H2-21	3.3.1.71	B
Valve	PB	Copper Alloy	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Valve	PB	Copper Alloy	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.H2-8	3.3.1.51	B

Notes for Table 3.3.2-21:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
G Environment not in NUREG-1801 for this component and material.
H Aging effect not in NUREG-1801 for this component, material, and environment combination.

Plant Specific Notes:
1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Attemperator	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Attemperator	LBS	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-16	3.4.1.02	A
Attemperator	LBS	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.A-17	3.4.1.29	B
Closure Bolting	LBS	Carbon Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	LBS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	VII.I-2	3.3.1.89	A
Closure Bolting	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Filter	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Filter	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Flow Element	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Flow Element	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Flow Element	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flow Element	LBS	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-10	3.4.1.39	E, 4
Flow Element	LBS	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-12	3.4.1.37	E, 4
Flow Element	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Flow Element	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Heat Exchanger (RCDT Heat Exchanger)	LBS, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-1	3.3.1.48	B
Heat Exchanger (RCDT Heat Exchanger)	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (RCDT Heat Exchanger)	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Heat Exchanger (RCDT Heat Exchanger)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Heat Exchanger (RCDT Heat Exchanger)	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Orifice	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Orifice	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Orifice	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Orifice	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Orifice	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Piping	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Piping	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Piping	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Piping	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 3
Piping	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Piping	LBS	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-16	3.4.1.02	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.A-17	3.4.1.29	B
Piping	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	LBS, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	PB, SIA, SS	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Piping	LBS, PB, SIA, SS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Piping	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Piping	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Piping	LBS	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS	Stainless Steel Cast Austenitic	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Pump	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Pump	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS	Cast Iron	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Pump	LBS	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Pump	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Pump	SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	SIA	Stainless Steel Cast Austenitic	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Sample Vessel	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sample Vessel	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Sight Gauge	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Sight Gauge	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 3
Sight Gauge	LBS	Glass	Demineralized Water (Int)	None	None	VII.J-13	3.3.1.93	A
Sight Gauge	LBS	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Sight Gauge	LBS	Glass	Raw Water (Int)	None	None	VII.J-11	3.3.1.93	A
Sight Gauge	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Sight Gauge	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Strainer	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Strainer	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 3
Strainer	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Strainer	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tank	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Tank	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Tank	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Tank	SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	C
Tank	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS, SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Tank	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Tank	LBS, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tank	SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Tank	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Thermowell	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Thermowell	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Thermowell	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Thermowell	LBS	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-10	3.4.1.39	E, 4
Thermowell	LBS	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-12	3.4.1.37	E, 4
Thermowell	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Thermowell	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Tubing	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Tubing	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tubing	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Tubing	LBS	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-10	3.4.1.39	E, 4
Tubing	LBS	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-12	3.4.1.37	E, 4
Tubing	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Tubing	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Valve	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Valve	LBS	Carbon Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Valve	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 3
Valve	LBS	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Valve	LBS	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-16	3.4.1.02	A
Valve	LBS	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.A-17	3.4.1.29	B
Valve	LBS	Copper Alloy	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-5	3.4.1.15	A
Valve	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Copper Alloy	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-9	3.3.1.81	E, 3
Valve	LBS	Copper Alloy	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-5	3.4.1.15	A
Valve	LBS, PB, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Valve	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-10	3.4.1.39	E, 4
Valve	LBS	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.A-12	3.4.1.37	E, 4
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Valve	LBS, PB, SIA	Stainless Steel	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS	Stainless Steel Cast Austenitic	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E

Table 3.3.2-22 Auxiliary Systems – Summary of Aging Management Evaluation – Liquid Waste Processing System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, SIA	Stainless Steel Cast Austenitic	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 3
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-20	3.3.1.90	E, 4

Notes for Table 3.3.2-22:

Standard Notes:

- A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
- C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
- E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
- G Environment not in NUREG-1801 for this component and material.
- H Aging effect not in NUREG-1801 for this component, material and environment combination.

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 Operating experience does not suggest there is any aging effect, and the use of stainless steel up to 200°F and 50 weight-percent NaOH is common in industrial applications with no special consideration for aging. There is no NUREG-1801 line that covers NaOH environment.

3 The component environment is miscellaneous radioactive waste drains that have been evaluated as a raw water environment. Loss of material on internal component surfaces exposed to a mixed waste water environment classified as raw water is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) instead of Open-Cycle Cooling Water System (B2.1.9).

4 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flow Element	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flow Element	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Piping	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Piping	LBS, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	PB, SIA	Stainless Steel	Encased in Concrete (Ext)	None	None	VII.J-17	3.3.1.96	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Piping	LBS	Stainless Steel	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-15	3.3.1.79	E, 3
Piping	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Piping	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4
Piping	LBS	Stainless Steel	Ventilation Atmosphere (Ext)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E, 5
Pump	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tank	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tank	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Tubing	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Ductile Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Ductile Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Valve	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS, PB	Stainless Steel	Plant Indoor Air (Int)	None	None	None	None	G
Valve	LBS, PB, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Valve	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4

Table 3.3.2-23 Auxiliary Systems – Summary of Aging Management Evaluation – Radioactive Vents and Drains System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Stainless Steel Cast Austenitic	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS	Stainless Steel Cast Austenitic	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS	Stainless Steel Cast Austenitic	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Valve	LBS, PB, SIA	Stainless Steel Cast Austenitic	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Valve	LBS	Stainless Steel Cast Austenitic	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 4

Notes for Table 3.3.2-23:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The component environment is miscellaneous radioactive waste drains that have been evaluated as a raw water environment. Loss of material on internal component surfaces exposed to a mixed waste water environment classified as raw water is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) instead of Open-Cycle Cooling Water System (B2.1.9).

3 The component environment is radioactive waste drains that have been evaluated as a raw water environment. Loss of material on external component surface exposed to floor and equipment drains environment is managed by External Surfaces Monitoring (B2.1.20) instead of Open-Cycle Cooling Water System (B2.1.9).

4 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

5 The component type is internal to the ducting system, so internal inspection was selected instead of using external surfaces inspection. The environment is external ventilation air.

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Piping	PB	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Piping	LBS, SIA	Carbon Steel	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-19	3.3.1.76	E, 3
Piping	LBS, SIA	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Piping	PB	Carbon Steel (Galvanized)	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Piping	LBS, PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS, PB	Carbon Steel (Galvanized)	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Piping	LBS, PB	Carbon Steel (Galvanized)	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Piping	PB	Cast Iron	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Piping	LBS, PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Cast Iron	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B
Piping	LBS	Cast Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Piping	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Ext)	None	None	None	None	F
Piping	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Int)	None	None	None	None	F
Piping	LBS	Polyvinyl Chloride (PVC)	Raw Water (Int)	None	None	None	None	F
Piping	PB	Stainless Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A
Piping	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Piping	LBS, PB	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Pump	LBS	Cast Iron (Gray Cast Iron)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Pump	LBS	Cast Iron (Gray Cast Iron)	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.G-14	3.3.1.85	B
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-19	3.2.1.32	B
Valve	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Valve	PB	Cast Iron	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-9	3.3.1.58	B
Valve	PB	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-24 Auxiliary Systems – Summary of Aging Management Evaluation – Nonradioactive Waste Plumbing and Sumps System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Cast Iron	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.G-23	3.3.1.71	B
Valve	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS	Copper Alloy	Raw Water (Int)	Loss of material	Open-Cycle Cooling Water System (B2.1.9)	VII.C1-9	3.3.1.81	B
Valve	LBS	Ductile Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS	Ductile Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Valve	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2

Notes for Table 3.3.2-24:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

F Material not in NUREG-1801 for this component.

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The internal environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

3 The external environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The External Surfaces Monitoring Program (B2.1.20) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.C1-18	3.3.1.19	D
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	PB	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Piping	PB	Carbon Steel (Galvanized)	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	PB	Carbon Steel (Galvanized)	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-19	3.3.1.76	E, 3
Piping	PB	Carbon Steel (Galvanized)	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Piping	PB	Cast Iron	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.C1-18	3.3.1.19	B
Piping	PB	Cast Iron	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	A

Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Cast Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	PB	Stainless Steel	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-15	3.3.1.79	E, 3
Piping	PB	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2
Pump	PB	Cast Iron	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-19	3.3.1.76	E, 3
Pump	PB	Cast Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Valve	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A

Table 3.3.2-25 Auxiliary Systems – Summary of Aging Management Evaluation – Oily Waste System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Copper Alloy	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-9	3.3.1.81	E, 2
Valve	PB	Ductile Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Ductile Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 2
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	PB	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 2

<u>Notes for Table 3.3.2-25:</u>

<u>Standard Notes:</u>

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The internal environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

3 The external environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The External Surfaces Monitoring Program (B2.1.20) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Flexible Hoses	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Flow Element	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Piping	PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	PB, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-3	3.3.1.72	B

Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Pump	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Sight Gauge	PB	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Sight Gauge	PB	Glass	Plant Indoor Air (Int)	None	None	VII.J-7	3.3.1.93	A
Sight Gauge	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Sight Gauge	PB	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Tubing	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-1	3.3.1.27	E
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	PB	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-3	3.3.1.72	B
Valve	PB	Elastomer	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.F1-5	3.3.1.34	E
Valve	PB	Elastomer	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F1-6	3.3.1.34	E
Valve	PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-26 Auxiliary Systems – Summary of Aging Management Evaluation – Radiation Monitoring (area and process) Mechanical System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F3-1	3.3.1.27	E

Notes for Table 3.3.2-26:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

None

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Accumulator	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Closure Bolting	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-1	3.3.1.43	B
Closure Bolting	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-1	3.4.1.22	B
Closure Bolting	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VII.I-4	3.3.1.43	B
Closure Bolting	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VII.I-5	3.3.1.45	B
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-4	3.4.1.22	B
Closure Bolting	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B
Closure Bolting	SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	H, 1
Closure Bolting	LBS	Stainless Steel	Borated Water Leakage (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	IV.C2-8	3.1.1.52	B
Closure Bolting	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Filter	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Filter	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-1	3.3.1.27	E
Heat Exchanger (Boron Recycle Evaporator)	LBS	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	IV.C2-14	3.1.1.53	B
Heat Exchanger (Boron Recycle Evaporator)	LBS	Carbon Steel	Plant Indoor Air (Ext)	None	None	VII.J-20	3.3.1.95	A
Piping	SIA	Aluminum	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Piping	SIA	Aluminum	Dry Gas (Int)	None	None	VIII.I-1	3.4.1.44	A
Piping	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H1-8	3.3.1.60	B
Piping	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-8	3.4.1.28	D

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.H1-9	3.3.1.19	B
Piping	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Piping	SIA	Carbon Steel	Dry Gas (Int)	None	None	VIII.I-15	3.4.1.44	A
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B
Piping	LBS	Carbon Steel	Raw Water (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.C1-19	3.3.1.76	E, 5
Piping	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 4

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Carbon Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 9
Piping	LBS, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Piping	LBS, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Piping	LBS	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.E-35	3.4.1.29	B
Piping	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Piping	LBS	Copper Alloy	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Piping	LBS	Copper Alloy (>15% Zinc)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Piping	LBS	Copper Alloy (>15% Zinc)	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.C1-10	3.3.1.84	B
Piping	LBS	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VII.J-14	3.3.1.94	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Nickel Alloys	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Piping	LBS	Nickel Alloys	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-13	3.3.1.78	E, 3
Piping	LBS	Nickel Alloys	Sodium Hydroxide (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Piping	LBS	Polyvinyl Chloride (PVC)	Plant Indoor Air (Ext)	None	None	None	None	F, 6
Piping	LBS	Polyvinyl Chloride (PVC)	Potable Water (Int)	None	None	None	None	F, 6
Piping	SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Piping	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Piping	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Piping	LBS, SIA	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Piping	LBS, SIA	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 4
Piping	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Piping	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 7
Pump	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	C
Pump	LBS	Copper Alloy	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Pump	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Sight Gauge	LBS	Glass	Plant Indoor Air (Ext)	None	None	VII.J-8	3.3.1.93	A
Sight Gauge	LBS	Glass	Plant Indoor Air (Int)	None	None	VII.J-7	3.3.1.93	A
Sight Gauge	LBS	Glass	Sodium Hydroxide (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Sight Gauge	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Sight Gauge	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Sight Gauge	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Strainer	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Strainer	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Tank	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Tank	LBS	Carbon Steel	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Tank	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-40	3.4.1.06	A
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	C
Tank	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Tank	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Tubing	LBS	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Tubing	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Tubing	LBS	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 7
Valve	SIA	Aluminum	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	None	None	G
Valve	SIA	Aluminum	Dry Gas (Int)	None	None	VIII.I-1	3.4.1.44	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.H1-8	3.3.1.60	B
Valve	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-8	3.4.1.28	D
Valve	SIA	Carbon Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VII.H1-9	3.3.1.19	B
Valve	LBS, SIA	Carbon Steel	Closed Cycle Cooling Water (Int)	Loss of material	Closed-Cycle Cooling Water System (B2.1.10)	VII.C2-14	3.3.1.47	B
Valve	SIA	Carbon Steel	Dry Gas (Int)	None	None	VII.J-23	3.3.1.97	A
Valve	SIA	Carbon Steel	Dry Gas (Int)	None	None	VIII.I-15	3.4.1.44	A
Valve	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	None	None	VII.J-20	3.3.1.95	A
Valve	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Valve	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.F2-3	3.3.1.72	B

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Carbon Steel	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Valve	LBS, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Valve	LBS, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-34	3.4.1.04	A
Valve	LBS	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.E-35	3.4.1.29	B
Valve	LBS	Cast Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B
Valve	LBS	Cast Iron	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Valve	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	C

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Copper Alloy	Potable Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Valve	LBS	Copper Alloy	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-9	3.3.1.81	E, 4
Valve	LBS	Copper Alloy (>15% Zinc)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS	Copper Alloy (>15% Zinc)	Raw Water (Int)	Loss of material	Selective Leaching of Materials (B2.1.17)	VII.C1-10	3.3.1.84	B
Valve	LBS	Copper Alloy (Aluminum > 8%)	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS	Copper Alloy (Aluminum > 8%)	Raw Water (Int)	Loss of material	Selective Leaching of Aluminum Bronze (B2.1.37)	VII.C1-10	3.3.1.84	E, 8
Valve	LBS, PB	Ductile Iron	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VII.I-8	3.3.1.58	B

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB	Ductile Iron	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-19	3.3.1.76	E, 4
Valve	LBS	Nickel Alloys	Plant Indoor Air (Ext)	None	None	VII.J-14	3.3.1.94	A
Valve	LBS	Nickel Alloys	Sodium Hydroxide (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	None	None	G
Valve	SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Valve	LBS, SIA	Stainless Steel	Borated Water Leakage (Ext)	None	None	VII.J-16	3.3.1.99	A
Valve	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	SIA	Stainless Steel	Dry Gas (Int)	None	None	VII.J-19	3.3.1.97	A
Valve	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VII.J-15	3.3.1.94	A
Valve	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A

Table 3.3.2-27 Auxiliary Systems – Summary of Aging Management Evaluation – Miscellaneous Systems in scope ONLY for Criterion 10 CFR 54.4(a)(2) (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS	Stainless Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	V.A-26	3.2.1.08	E
Valve	LBS	Stainless Steel	Raw Water (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VII.C1-15	3.3.1.79	E, 4
Valve	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Valve	LBS	Stainless Steel	Sodium Hydroxide (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	None	None	G, 2
Valve	LBS, SIA	Stainless Steel	Treated Borated Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VII.E1-17	3.3.1.91	E, 7

Notes for Table 3.3.2-27:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

F Material not in NUREG-1801 for this component.

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 Operating experience does not suggest there is any aging effect, and the use of stainless steel up to 200°F and 50 weight-percent NaOH is common in industrial applications with no special consideration for aging. There is no NUREG-1801 line that includes NaOH environment.

3 The component environment is radioactive waste drains that have been evaluated as a raw water environment. Loss of material on internal component surface exposed to radioactive waste drains environment is managed by Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) instead of the Open-Cycle Cooling Water program (B2.1.9).

4 The internal environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

5 The external environment of these components is comprised of nonradioactive waste streams which may include oil and other contaminants that are evaluated as raw water. The External Surfaces Monitoring (B2.1.20) manages this uncontrolled raw water environment rather than the Open-Cycle Cooling Water program (B2.1.9).

6 PVC is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, oils, and ozone.

7 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

8 Loss of material by selective leaching will be managed by Selective Leaching of Aluminum Bronze (B2.1.37) instead of Selective Leaching of Materials (B2.1.17) for components made of aluminum bronze (copper alloy greater than 8 percent aluminum).

9 The internal environment of these components is comprised of raw water. The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program (B2.1.22) manages this raw water environment more appropriately than Open-Cycle Cooling Water program (B2.1.9).

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEM

3.4.1 Introduction

Section 3.4 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.3.4, Steam and Power Conversion System, subject to AMR. These systems are described in the following sections:

- Main steam system (Section 2.3.4.1)
- Auxiliary steam system and boilers(Section 2.3.4.2)
- Feedwater system (Section 2.3.4.3)
- Demineralized water (make-up) system (Section 2.3.4.4)
- Steam generator blowdown system (Section 2.3.4.5)
- Auxiliary feedwater system (Section 2.3.4.6)

Table 3.4.1, Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System, provides the summary of the programs evaluated in NUREG-1801 that are applicable to the component types in this section. Table 3.4.1 uses the format of Table 1 described in Section 3.0.

3.4.2 Results

The following tables summarize the results of the aging management review for the systems in the Steam and Power Conversion System area:

- Table 3.4.2-1, Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System
- Table 3.4.2-2, Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Steam System and Boilers
- Table 3.4.2-3, Steam and Power Conversion System – Summary of Aging Management Evaluation – Feedwater System
- Table 3.4.2-4, Steam and Power Conversion System – Summary of Aging Management Evaluation – Demineralized Water (Make-up) System
- Table 3.4.2-5, Steam and Power Conversion System – Summary of Aging Management Evaluation – Steam Generator Blowdown System

- Table 3.4.2-6, Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System

These tables use the format of Table 2 discussed in Section 3.0.

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

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above systems in the following subsections.

3.4.2.1.1 Main Steam System

Materials

The materials of construction for the main steam system component types are:

- Aluminum
- Carbon Steel
- Copper Alloy
- Insulation Calcium Silicate
- Insulation Fiberglass
- Stainless Steel

Environment

The main steam system components are exposed to the following environments:

- Atmosphere/Weather
- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Secondary Water
- Steam

Aging Effects Requiring Management

The following main steam system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the main steam system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.4.2.1.2 Auxiliary Steam System and Boilers

Materials

The materials of construction for the auxiliary steam system and boilers component types are:

- Carbon Steel
- Stainless Steel

Environment

The auxiliary steam system and boilers components are exposed to the following environments:

- Plant Indoor Air
- Steam

Aging Effects Requiring Management

The following auxiliary steam system and boilers aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the auxiliary steam system and boilers component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.4.2.1.3 Feedwater System

Materials

The materials of construction for the feedwater system component types are:

- Aluminum
- Carbon Steel
- Insulation Calcium Silicate
- Insulation Fiberglass
- Stainless Steel

Environment

The feedwater system components are exposed to the following environments:

- Dry Gas
- Lubricating Oil
- Plant Indoor Air
- Secondary Water

Aging Effects Requiring Management

The following feedwater system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the feedwater system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.4.2.1.4 Demineralizer Water (Make-up) System

Materials

The materials of construction for the demineralized water (make-up) system component types are:

- Carbon Steel
- Copper Alloy
- Stainless Steel

Environment

The demineralized water (make-up) system components are exposed to the following environments:

- Atmosphere/ Weather
- Buried
- Demineralized Water

- Plant Indoor Air

Aging Effects Requiring Management

The following demineralized water (make-up) system aging effects require management:

- Loss of material
- Loss of preload

Aging Management Programs

The following aging management programs manage the aging effects for the demineralized water (make-up) system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.4.2.1.5 Steam Generator Blowdown System

Materials

The materials of construction for the steam generator blowdown system component types are:

- Aluminum
- Carbon Steel
- Copper Alloy
- Insulation Calcium Silicate
- Insulation Fiberglass
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The steam generator blowdown system components are exposed to the following environments:

- Demineralized Water
- Plant Indoor Air
- Secondary Water
- Steam

Aging Effects Requiring Management

The following steam generator blowdown system aging effects require management:

- Cracking
- Loss of material
- Loss of preload
- Wall thinning

Aging Management Programs

The following aging management programs manage the aging effects for the steam generator blowdown system component types:

- Bolting Integrity (B2.1.7)
- External Surfaces Monitoring Program (B2.1.20)
- Flow-Accelerated Corrosion (B2.1.6)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

3.4.2.1.6 Auxiliary Feedwater System

Materials

The materials of construction for the auxiliary feedwater system component types are:

- Aluminum
- Carbon Steel
- Stainless Steel
- Stainless Steel Cast Austenitic

Environment

The auxiliary feedwater system components are exposed to the following environments:

- Atmosphere/ Weather
- Buried
- Dry Gas
- Encased in Concrete
- Lubricating Oil
- Plant Indoor Air
- Secondary Water
- Steam

Aging Effects Requiring Management

The following auxiliary feedwater system aging effects require management:

- Loss of material
- Loss of preload
- Reduction of heat transfer

Aging Management Programs

The following aging management programs manage the aging effects for the auxiliary feedwater system component types:

- Bolting Integrity (B2.1.7)
- Buried Piping and Tanks Inspection (B2.1.18)
- External Surfaces Monitoring Program (B2.1.20)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)
- Lubricating Oil Analysis (B2.1.23)
- One-Time Inspection (B2.1.16)
- Water Chemistry (B2.1.2)

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation. For the Steam and Power Conversion System, those evaluations are addressed in the following subsections.

3.4.2.2.1 Cumulative Fatigue Damage

Evaluation of fatigue is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1).

STP piping designed to ASME III Class 2, Class 3, and ANSI B31.1 assumes a reduction in the allowable secondary stress range if more than 7,000 full-range thermal cycles are expected in a design lifetime. Section 4.3.5 describes the evaluation of these cyclic design TLAAs.

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

3.4.2.2.2.1 Steel piping and components, tanks, and heat exchangers exposed to treated water and steel piping and components exposed to steam

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material for steel piping and components exposed to secondary water and piping and components exposed to secondary system steam. The one-time inspection includes selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

STP has no in-scope heat exchangers in the steam and power conversion systems. Therefore, Table 3.4.1, line 3.4.1.03 for steel heat exchanger components exposed to treated water is not applicable to STP.

3.4.2.2.2.2 Steel piping and components exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manages loss of material due to general, pitting, and crevice corrosion for carbon steel components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

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

Not applicable. STP has no in-scope components exposed to raw water in the auxiliary feedwater system, so the applicable NUREG-1801 line was not used.

3.4.2.2.4 Reduction of Heat Transfer due to Fouling

3.4.2.2.4.1 Stainless steel and copper alloy heat exchanger tubes exposed to treated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages loss of heat transfer due to fouling for copper alloy components exposed to secondary water. The one-time inspection will include selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.4.2.2.4.2 Stainless steel and copper alloy heat exchanger tubes exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manages reduction of heat transfer due to fouling for copper alloy components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

3.4.2.2.5 Loss of Material due to General, Pitting, Crevice, and Microbiologically-Influenced Corrosion

3.4.2.2.5.1 Steel piping and components and tanks exposed to soil

Not applicable. STP has no in-scope buried steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil in the condensate or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.

3.4.2.2.5.2 Steel heat exchanger components exposed to lubricating oil

Not applicable. STP has no in-scope steel heat exchanger components exposed to lubricating oil in the auxiliary feedwater system, so the applicable NUREG-1801 lines were not used.

3.4.2.2.6 Cracking due to Stress Corrosion Cracking

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages cracking due to stress corrosion cracking for stainless steel components exposed to secondary water. The one-time inspection will include selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.4.2.2.7 Loss of Material due to Pitting and Crevice Corrosion

3.4.2.2.7.1 Stainless steel, aluminum, and copper alloy piping and components and stainless steel tanks and heat exchangers exposed to treated water

The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages loss of material due to pitting and crevice corrosion for stainless steel and copper alloy components exposed to secondary water and demineralized water. The one-time inspection will include selected components at susceptible locations where contaminants could accumulate (e.g. stagnant flow locations).

3.4.2.2.7.2 Stainless steel piping and components exposed to soil

The Buried Piping and Tanks Inspection program (B2.1.18) manages loss of material due to pitting and crevice corrosion for stainless steel piping external surfaces exposed to soil.

3.4.2.2.7.3 Copper alloy piping and components exposed to lubricating oil

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection program (B2.1.16) manages loss of material due to general, pitting and crevice corrosion for copper alloy components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

3.4.2.2.8 Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion

The Lubricating Oil Analysis program (B2.1.23) and the One-Time Inspection Program (B2.1.16) manage loss of material due to pitting, crevice corrosion, and microbiologically-influenced corrosion for stainless steel components exposed to lubricating oil. The one-time inspection will include selected components at susceptible locations where contaminants such as water could accumulate.

3.4.2.2.9 Loss of Material due to General, Pitting, Crevice, and Galvanic Corrosion

Not applicable to STP, applicable to BWR only.

3.4.2.2.10 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.4.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the Steam and Power Conversion System component types. The section within Chapter 4, Time-Limited Aging Analyses, is indicated in parenthesis.

- Cumulative Fatigue Damage (Section 4.3, Metal Fatigue Analysis)

3.4.3 Conclusions

The Steam and Power Conversion System component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the Steam and Power Conversion System component types are identified in the summary Tables and in Section 3.4.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the Steam and Power Conversion System component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.01	Steel piping, piping components, and piping elements exposed to steam or treated water	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.4.2.2.1.
3.4.1.02	Steel piping, piping components, and piping elements exposed to steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.2.1.
3.4.1.03	Steel heat exchanger components exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in scope steel heat exchanger components in the steam and power conversion systems, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.4.2.2.2.1.
3.4.1.04	Steel piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.2.1.
3.4.1.05					Not applicable - BWR only

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.06	Steel and stainless steel tanks exposed to treated water	Loss of material due to general (steel only) pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.7.1.
3.4.1.07	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.4.2.2.2.2.
3.4.1.08	Steel piping, piping components, and piping elements exposed to raw water	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling	A plant-specific aging management program is to be evaluated.	Yes	Not applicable. STP has no in-scope components exposed to raw water in the auxiliary feedwater system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.4.2.2.3.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.09	Stainless steel and copper alloy heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.4.1.
3.4.1.10	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.4.2.2.4.2.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.11	Buried steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Buried Piping and Tanks Inspection (B2.1.18)	Yes	Not applicable. STP has no in-scope buried steel piping, piping components, piping elements, and tanks (with or without coating or wrapping) exposed to soil in the condensate or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.4.2.2.5.1.
3.4.1.12	Steel heat exchanger components exposed to lubricating oil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Not applicable. STP has no in-scope steel heat exchanger components exposed to lubricating oil in the auxiliary feedwater system, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.4.2.2.5.2
3.4.1.13					Not applicable - BWR only

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.14	Stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.6.
3.4.1.15	Aluminum and copper alloy piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.7.1.
3.4.1.16	Stainless steel piping, piping components, and piping elements; tanks, and heat exchanger components exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.4.2.2.7.1.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.17	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes	Consistent with NUREG-1801. The plant-specific aging management program(s) used to manage the aging include: Buried Piping and Tanks Inspection (B2.1.18). See further evaluation in Section 3.4.2.2.7.2.
3.4.1.18	Copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.4.2.2.7.3.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.19	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Lubricating Oil Analysis (B2.1.23). See further evaluation in Section 3.4.2.2.8.
3.4.1.20	Steel tanks exposed to air – outdoor (external)	Loss of material/ general, pitting, and crevice corrosion	Aboveground Steel Tanks	No	Not applicable. STP has no in-scope steel tanks in the condensate or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity (B2.1.7)	No	Not applicable. STP has no in-scope high strength bolting in the steam and power conversion systems, so the applicable NUREG-1801 line was not used.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.22	Steel bolting and closure bolting exposed to air with steam or water leakage, air – outdoor (external), or air – indoor uncontrolled (external);	Loss of material due to general, pitting and crevice corrosion; loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.4.1.23	Stainless steel piping, piping components, and piping elements exposed to closed-cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope stainless steel components exposed to closed cycle cooling water in the condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.24	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope steel components exposed to closed cycle cooling water in the feedwater, condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.25	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Closed-Cycle Cooling Water System (B2.1.10)
3.4.1.26	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope copper alloy components exposed to closed-cycle cooling water in the condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.27	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System (B2.1.10)	No	Not applicable. STP has no in-scope steel, stainless steel, or copper alloy components exposed to closed-cycle cooling water in the steam turbine, condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.28	Steel external surfaces exposed to air – indoor uncontrolled (external), condensation (external), or air outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring (B2.1.20)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: External Surfaces Monitoring Program (B2.1.20)

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.29	Steel piping, piping components, and piping elements exposed to steam or treated water	Wall thinning due to flow-accelerated corrosion	Flow-Accelerated Corrosion (B2.1.6)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Flow-Accelerated Corrosion (B2.1.6)
3.4.1.30	Steel piping, piping components, and piping elements exposed to air outdoor (internal) or condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.31	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope components exposed to raw water in the condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.32	Stainless steel and copper alloy piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope components exposed to raw water in the feedwater, condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.33	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope components exposed to raw water in the condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.34	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System (B2.1.9)	No	Not applicable. STP has no in-scope components exposed to raw water in the condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.35	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water, raw water, or treated water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope copper alloy >15% Zn components in the feedwater, condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.
3.4.1.36	Gray cast iron piping, piping components, and piping elements exposed to soil, treated water, or raw water	Loss of material due to selective leaching	Selective Leaching of Materials (B2.1.17)	No	Not applicable. STP has no in-scope gray cast iron components in the feedwater, condensate, blowdown, or auxiliary feedwater systems, so the applicable NUREG-1801 lines were not used.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.37	Steel, stainless steel, and nickel-based alloy piping, piping components, and piping elements exposed to steam	Loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.
3.4.1.38	Steel bolting and external surfaces exposed to air with borated water leakage	Loss of material due to boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Not applicable. STP has no in-scope components exposed to borated water leakage in the steam and power conversion systems, so the applicable NUREG-1801 lines were not used.
3.4.1.39	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry (B2.1.2)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16) is credited.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.40	Glass piping elements exposed to air, lubricating oil, raw water, and treated water	None	None	No	Not applicable. STP has no in-scope glass components in the steam and power conversion systems, so the applicable NUREG-1801 lines were not used.
3.4.1.41	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	No	Consistent with NUREG-1801.
3.4.1.42	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	No	Consistent with NUREG-1801.
3.4.1.43	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	No	Consistent with NUREG-1801.

Table 3.4.1 Summary of Aging Management Evaluations in Chapter VIII of NUREG-1801 for Steam and Power Conversion System (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.44	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	No	Consistent with NUREG-1801.

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Accumulator	PB	Carbon Steel	Dry Gas (Int)	None	None	VIII.I-15	3.4.1.44	C
Accumulator	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	D
Accumulator	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-4	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B
Filter	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	D
Filter	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Insulation	INS	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	C
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J
Orifice	PB, TH	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	B
Orifice	PB, TH	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Orifice	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Orifice	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A
Orifice	LBS, SIA	Stainless Steel	Secondary Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-5	3.4.1.14	A
Piping	LBS, SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-8	3.4.1.28	B
Piping	LBS, SIA	Carbon Steel	Atmosphere/ Weather (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.B1-6	3.4.1.30	B

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Dry Gas (Int)	None	None	VIII.I-15	3.4.1.44	A
Piping	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.B1-7	3.4.1.30	B
Piping	PB	Carbon Steel	Secondary Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VIII.B1-10	3.4.1.01	A
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 1
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B
Piping	PB	Carbon Steel	Steam (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VIII.B1-10	3.4.1.01	A

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Stainless Steel	Dry Gas (Int)	None	None	VIII.I-12	3.4.1.44	A
Piping	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-9	3.4.1.19	B
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Pump	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	B
Pump	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Sight Gauge	PB	Copper Alloy	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-3	3.4.1.18	B
Sight Gauge	PB	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Solenoid Valve	PB	Aluminum	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	None	None	G
Solenoid Valve	PB	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Tank	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-9	3.4.1.19	D

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tank	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	C
Thermowell	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Thermowell	PB	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 1
Thermowell	PB	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B
Trap	LBS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Trap	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.B1-7	3.4.1.30	B
Tubing	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS, PB	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-2	3.4.1.39	E, 1
Tubing	LBS, PB	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-3	3.4.1.37	E, 1

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Aluminum	Dry Gas (Int)	None	None	VIII.I-1	3.4.1.44	A
Valve	PB	Aluminum	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	None	None	G
Valve	PB	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Valve	PB	Carbon Steel	Dry Gas (Int)	None	None	VIII.I-15	3.4.1.44	A
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.A-14	3.4.1.07	B
Valve	LBS	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.B1-7	3.4.1.30	B
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Valve	PB	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 1

Table 3.4.2-1 Steam and Power Conversion System – Summary of Aging Management Evaluation – Main Steam System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B

Notes for Table 3.4.2-1:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

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

Plant Specific Notes:

1 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.4.2-2 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Steam System and Boilers

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-4	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Flow Element	PB	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-2	3.4.1.39	E, 1
Flow Element	PB	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-3	3.4.1.37	E, 1
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	D
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 1
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS, PB, SIA	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-2	3.4.1.39	E, 1

Table 3.4.2-2 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Steam System and Boilers (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	LBS, PB, SIA	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-3	3.4.1.37	E, 1
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	D
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 1
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B

Notes for Table 3.4.2-2:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

1 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.4.2-3 Steam and Power Conversion System – Summary of Aging Management Evaluation – Feedwater System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-4	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B, 1
Closure Bolting	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Flow Element	PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-4	3.4.1.16	A
Flow Element	PB	Stainless Steel	Secondary Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-5	3.4.1.14	A
Insulation	INS	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	C
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J
Orifice	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Orifice	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-4	3.4.1.16	A

Table 3.4.2-3 Steam and Power Conversion System – Summary of Aging Management Evaluation – Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Orifice	LBS, SIA	Stainless Steel	Secondary Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-5	3.4.1.14	A
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	PB	Carbon Steel	Secondary Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VIII.D1-7	3.4.1.01	A
Piping	LBS, PB, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Piping	LBS, PB, SIA	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.D1-9	3.4.1.29	B
Piping	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.D1-3	3.4.1.19	B
Piping	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Pump	LBS, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.D1-6	3.4.1.07	B

Table 3.4.2-3 Steam and Power Conversion System – Summary of Aging Management Evaluation – Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Tubing	LBS, PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Tubing	LBS, PB	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VII.E1-18	3.3.1.02	A
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Valve	LBS, PB, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-8	3.4.1.04	A
Valve	LBS, PB	Carbon Steel	Secondary Water (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.D1-9	3.4.1.29	B
Valve	PB	Stainless Steel	Dry Gas (Int)	None	None	VIII.I-12	3.4.1.44	A
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A

Table 3.4.2-3 Steam and Power Conversion System – Summary of Aging Management Evaluation – Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-4	3.4.1.16	A
Valve	PB	Stainless Steel	Secondary Water (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.D1-5	3.4.1.14	A
Valve Operator	LBS, SIA	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.D1-6	3.4.1.07	D
Valve Operator	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B

Notes for Table 3.4.2-3:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.4.2-4 Steam and Power Conversion System – Summary of Aging Management Evaluation – Demineralized Water (Make-up) System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-1	3.4.1.22	B
Closure Bolting	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.G-34	3.4.1.30	B
Piping	SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Piping	SIA	Stainless Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VIII.E-28	3.4.1.17	E
Piping	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Pump	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A

Table 3.4.2-4 Steam and Power Conversion System – Summary of Aging Management Evaluation – Demineralized Water (Make-up) System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tank	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-40	3.4.1.06	A
Tank	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	C
Tubing	LBS	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Tubing	LBS	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	LBS, SIA	Copper Alloy	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-15	3.4.1.15	A
Valve	LBS, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Valve	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-29	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A

<u>Notes for Table 3.4.2-4:</u>

<u>Standard Notes:</u>

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.

<u>Plant Specific Notes:</u>

1	Loss of preload is conservatively considered to be applicable for all closure bolting.

Table 3.4.2-5 Steam and Power Conversion System – Summary of Aging Management Evaluation – Steam Generator Blowdown System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Flow Element	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Flow Element	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-23	3.4.1.16	A
Flow Element	LBS, SIA	Stainless Steel	Steam (Int)	Cracking	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-2	3.4.1.39	E, 2
Flow Element	LBS, SIA	Stainless Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-3	3.4.1.37	E, 2
Insulation	INS	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	C
Insulation	INS	Insulation Fiberglass	Plant Indoor Air (Ext)	None	None	None	None	J
Insulation	INS	Insulation Calcium Silicate	Plant Indoor Air (Ext)	None	None	None	None	J

Table 3.4.2-5 Steam and Power Conversion System – Summary of Aging Management Evaluation – Steam Generator Blowdown System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.B1-7	3.4.1.30	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	LBS, PB, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 2
Piping	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B
Piping	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Piping	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A

Table 3.4.2-5 Steam and Power Conversion System – Summary of Aging Management Evaluation – Steam Generator Blowdown System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Pump	LBS, SIA	Stainless Steel Cast Austenitic	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-23	3.4.1.16	A
Strainer	LBS, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Strainer	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-23	3.4.1.16	A
Tank	SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Tank	SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 2
Tank	SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	D
Tubing	LBS, PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS, PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A

Table 3.4.2-5 Steam and Power Conversion System – Summary of Aging Management Evaluation – Steam Generator Blowdown System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Valve	LBS, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-11	3.4.1.04	A
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 2
Valve	LBS, PB, SIA	Carbon Steel	Steam (Int)	Wall thinning	Flow-Accelerated Corrosion (B2.1.6)	VIII.B1-9	3.4.1.29	B
Valve	LBS, SIA	Copper Alloy	Plant Indoor Air (Ext)	None	None	VIII.I-2	3.4.1.41	A
Valve	LBS, SIA	Copper Alloy	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-15	3.4.1.15	A
Valve	LBS, PB, SIA	Stainless Steel	Demineralized Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-4	3.4.1.16	A
Valve	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	LBS, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.F-23	3.4.1.16	A

Notes for Table 3.4.2-5:
Standard Notes:

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

Plant Specific Notes:
1 Loss of preload is conservatively considered to be applicable for all closure bolting.
2 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manages loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Bolting Integrity (B2.1.7)	VIII.H-4	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	VIII.H-5	3.4.1.22	B
Closure Bolting	LBS, PB, SIA	Stainless Steel	Atmosphere/ Weather (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Closure Bolting	PB	Stainless Steel	Plant Indoor Air (Ext)	Loss of preload	Bolting Integrity (B2.1.7)	None	None	H, 1
Filter	PB	Aluminum	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	None	None	G
Filter	PB	Aluminum	Plant Indoor Air (Ext)	None	None	V.F-2	3.2.1.50	A
Filter	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B
Filter	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Flow Element	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Flow Element	PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatch	PB	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Hatch	PB	Stainless Steel	Dry Gas (Int)	None	None	VIII.I-12	3.4.1.44	A
Heat Exchanger (AF Turbine Oil Cooler)	HT, PB	Stainless Steel	Lubricating Oil (Ext)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-3	3.4.1.19	B
Heat Exchanger (AF Turbine Oil Cooler)	HT, PB	Stainless Steel	Lubricating Oil (Ext)	Reduction of heat transfer	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-12	3.4.1.10	B
Heat Exchanger (AF Turbine Oil Cooler)	PB	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-3	3.4.1.19	B
Heat Exchanger (AF Turbine Oil Cooler)	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	C
Heat Exchanger (AF Turbine Oil Cooler)	HT, PB	Stainless Steel	Secondary Water (Int)	Reduction of heat transfer	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.E-13	3.4.1.09	A

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Heat Exchanger (AF Turbine Oil Cooler)	HT, PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	C
Orifice	PB, TH	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B
Orifice	PB, TH	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Orifice	PB, TH	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Orifice	PB, TH	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Piping	LBS, PB, SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-8	3.4.1.28	B
Piping	LBS, PB, SIA	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Piping	LBS, SIA	Carbon Steel	Plant Indoor Air (Int)	Loss of material	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B2.1.22)	VIII.G-34	3.4.1.30	B

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	PB	Carbon Steel	Secondary Water (Int)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	VIII.G-37	3.4.1.01	A
Piping	LBS, PB, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-38	3.4.1.04	A
Piping	LBS, PB, SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Piping	SIA	Stainless Steel	Atmosphere/ Weather (Int)	None	None	None	None	G, 3
Piping	PB	Stainless Steel	Buried (Ext)	Loss of material	Buried Piping and Tanks Inspection (B2.1.18)	VIII.G-31	3.4.1.17	E
Piping	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Piping	LBS, PB, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Pump	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B
Pump	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump	PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Pump	PB	Stainless Steel Cast Austenitic	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Tank	PB	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Tank	PB	Stainless Steel	Dry Gas (Int)	None	None	VIII.I-12	3.4.1.44	A
Tank	PB	Stainless Steel	Encased in Concrete (Ext)	None	None	VIII.I-11	3.4.1.43	C
Tank	PB	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	C
Thermowell	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B
Thermowell	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Tubing	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tubing	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Tubing	LBS, PB, SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Tubing	LBS, PB, SIA	Stainless Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-29	3.4.1.19	B
Tubing	LBS, PB, SIA	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Tubing	LBS, PB, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Turbine	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Turbine	PB	Carbon Steel	Steam (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.B1-8	3.4.1.37	E, 2
Valve	PB, SIA	Carbon Steel	Atmosphere/ Weather (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-8	3.4.1.28	B
Valve	PB	Carbon Steel	Lubricating Oil (Int)	Loss of material	Lubricating Oil Analysis (B2.1.23) and One-Time Inspection (B2.1.16)	VIII.G-35	3.4.1.07	B

Table 3.4.2-6 Steam and Power Conversion System – Summary of Aging Management Evaluation – Auxiliary Feedwater System (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Valve	PB	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	External Surfaces Monitoring Program (B2.1.20)	VIII.H-7	3.4.1.28	B
Valve	PB, SIA	Carbon Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-38	3.4.1.04	A
Valve	PB, SIA	Stainless Steel	Atmosphere/ Weather (Ext)	None	None	None	None	G
Valve	PB	Stainless Steel	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	PB, SIA	Stainless Steel	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A
Valve	SIA	Stainless Steel Cast Austenitic	Atmosphere/ Weather (Ext)	None	None	None	None	G
Valve	PB	Stainless Steel Cast Austenitic	Plant Indoor Air (Ext)	None	None	VIII.I-10	3.4.1.41	A
Valve	PB, SIA	Stainless Steel Cast Austenitic	Secondary Water (Int)	Loss of material	Water Chemistry (B2.1.2) and One-Time Inspection (B2.1.16)	VIII.G-32	3.4.1.16	A

Notes for Table 3.4.2-6:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

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

Plant Specific Notes:

1 Loss of preload is conservatively considered to be applicable for all closure bolting.

2 The Water Chemistry program (B2.1.2) and the One-Time Inspection program (B2.1.16) manage loss of material due to pitting and crevice corrosion and cracking due to stress corrosion cracking. The One-Time Inspection program (B2.1.16) includes selected components at susceptible locations.

3 These items are assigned the environment of Atmosphere/ Weather (Internal). The items are vented or open to the outside atmosphere so the distinction between internal and external is not relevant for aging purposes.
These stainless steel components are located outside with an uncontrolled external air environment and are not exposed to aggressive chemical species. The STP plant outdoor environment is not subject to industry air pollution or saline environment. Alternate wetting and drying has shown a tendency to "wash" the surface material rather than concentrate contaminants. Stainless steel does not experience any appreciable aging effects in this environment.

3.5 AGING MANAGEMENT OF CONTAINMENTS, STRUCTURES AND COMPONENT SUPPORTS

3.5.1 Introduction

Section 3.5 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.4, Scoping and Screening Results – Structures, subject to AMR. The structures are described in the following sections:

- Containment building (Section 2.4.1)
- Control room (Section 2.4.2)
- Diesel generator building (Section 2.4.3)
- Turbine generator building (Section 2.4.4)
- Mechanical-electrical auxiliary building (Section 2.4.5)
- Miscellaneous yard areas and buildings (in scope) (Section 2.4.6)
- Electrical foundations and structures (Section 2.4.7)
- Fuel handling building (Section 2.4.8)
- Essential cooling water structures (Section 2.4.9)
- Auxiliary feedwater storage tank foundation and shell (Section 2.4.10)
- Supports (Section 2.4.11)

Table 3.5.1, Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component types in this Section. Table 3.5.1 uses the format of Table 1 described in Section 3.0.

3.5.2 Results

The following tables summarize the results of the AMR for the structures and commodities in the containments, structures and component supports area:

- Table 3.5.2-1 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Containment Building
- Table 3.5.2-2 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Control Room

- Table 3.5.2-3 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Diesel Generator Building
- Table 3.5.2-4 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Turbine Generator Building
- Table 3.5.2-5 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Mechanical-Electrical Auxiliary Building
- Table 3.5.2-6 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Miscellaneous Yard Areas and Buildings (in scope)
- Table 3.5.2-7 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation – Electrical Foundations and Structures
- Table 3.5.2-8 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation – Fuel Handling Building
- Table 3.5.2-9 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation – Essential Cooling Water Structures
- Table 3.5.2-10 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation – Auxiliary Feedwater Storage Tank Foundation and Shell
- Table 3.5.2-11 Containments, Structures, and Component Supports - Summary of Aging Management Evaluation - Supports

These tables use the format of Table 2 discussed in Section 3.0.

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

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above structures and commodities in the following subsections.

3.5.2.1.1 Containment Building

Materials

The materials of construction for the containment building component types are:

- Carbon Steel
- Concrete
- Concrete Block (Masonry Walls)
- Elastomer
- Fire Barrier (Cementitious Coating)
- Stainless Steel

Environment

The containment building component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)
- Submerged (Structural)

Aging Effects Requiring Management

The following containment building aging effects require management:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity, permeability
- Loss of leak tightness
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of material, cracking
- Loss of sealing
- Loss of sealing; Leakage through containment

Aging Management Programs

The following aging management programs manage the aging effects for the containment building component types:

- 10 CFR Part 50, Appendix J (B2.1.30)
- ASME Section XI, Subsection IWE (B2.1.27)
- ASME Section XI, Subsection IWL (B2.1.28)
- Fire Protection (B2.1.12)
- Masonry Wall Program (B2.1.31)
- Structures Monitoring Program (B2.1.32)
- Water Chemistry (B2.1.2)

3.5.2.1.2 Control Room

Materials

The materials of construction for the control room component types are:

- Carbon Steel
- Concrete
- Elastomer
- Fire Barrier (Cementitious Coating)
- Gypsum/Plaster
- Stainless Steel

Environment

The control room component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following control room aging effects require management:

- Concrete cracking and spalling

- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of material, cracking

Aging Management Programs

The following aging management programs manage the aging effects for the control room component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.3 Diesel Generator Building

Materials

The materials of construction for the diesel generator building component types are:

- Carbon Steel
- Concrete
- Elastomer

Environment

The diesel generator building component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following diesel generator building aging effects require management:

- Concrete cracking and spalling
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the diesel generator building component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.4 Turbine Generator Building

Materials

The materials of construction for the turbine generator building component types are:

- Carbon Steel
- Concrete
- Elastomer

Environment

The turbine generator building component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)

- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following turbine generator building aging effects require management:

- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking

Aging Management Programs

The following aging management programs manage the aging effects for the turbine generator building component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.5 Mechanical-Electrical Auxiliary Building

Materials

The materials of construction for the mechanical-electrical auxiliary building component types are:

- Carbon Steel
- Concrete
- Concrete Block (Masonry Walls)
- Elastomer
- Fire Barrier (Cementitious Coating)
- Gypsum/Plaster

Environment

The mechanical-electrical auxiliary building component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following mechanical-electrical auxiliary building aging effects require management:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of material, cracking
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the mechanical-electrical auxiliary building component types:

- Fire Protection (B2.1.12)
- Masonry Wall Program (B2.1.31)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.6 Miscellaneous Yard Areas and Buildings (In Scope)

Materials

The materials of construction for the miscellaneous yard areas and buildings component types are:

- Aluminum
- Carbon Steel
- Concrete
- Elastomer
- Gypsum/Plaster

Environment

The miscellaneous yard areas and buildings component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following miscellaneous yard areas and buildings aging effects require management:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the miscellaneous yard areas and buildings component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.7 Electrical Foundations and Structures

Materials

The materials of construction for the electrical foundations and structures component types are:

- Carbon Steel
- Concrete
- Elastomer

Environment

The electrical foundations and structures component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following electrical foundations and structures aging effects require management:

- Concrete cracking and spalling
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Loss of material

- Loss of material (spalling, scaling) and cracking
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the electrical foundations and structures component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.8 Fuel Handling Building

Materials

The materials of construction for the fuel handling building component types are:

- Carbon Steel
- Concrete
- Elastomer
- Fire Barrier (Cementitious Coating)
- Stainless Steel

Environment

The fuel handling building component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)
- Submerged (Structural)

Aging Effects Requiring Management

The following fuel handling building aging effects require management:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion

- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of material, cracking
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the fuel handling building component types:

- Fire Protection (B2.1.12)
- Structures Monitoring Program (B2.1.32)
- Water Chemistry (B2.1.2)

3.5.2.1.9 Essential Cooling Water Structures

Materials

The materials of construction for the essential cooling water structures component types are:

- Carbon Steel
- Concrete
- Earthfill (rip-rap, stone, soil)
- Elastomer
- Stainless Steel

Environment

The essential cooling water structures component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)

- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)
- Submerged (Structural)

Aging Effects Requiring Management

The following essential cooling water structures aging effects require management:

- Concrete cracking and spalling
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Increased hardness, shrinkage and loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of material, loss of form
- Loss of sealing

Aging Management Programs

The following aging management programs manage the aging effects for the essential cooling water structures component types:

- Fire Protection (B2.1.12)
- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)
- Structures Monitoring Program (B2.1.32)

3.5.2.1.10 Auxiliary Feedwater Storage Tank Foundation and Shell

Materials

The materials of construction for auxiliary feedwater storage tank foundation and shell component types are:

- Carbon Steel
- Concrete
- Elastomer

Environment

The auxiliary feedwater storage tank foundation and shell component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Buried (Structural)
- Encased in Concrete
- Plant Indoor Air (Structural)

Aging Effects Requiring Management

The following auxiliary feedwater storage tank foundation and shell aging effects require management:

- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of sealing

Aging Management Programs

The following aging management program manages the aging effects for the auxiliary feedwater storage tank foundation and shell component types:

- Structures Monitoring Program (B2.1.32)

3.5.2.1.11 Supports

Materials

The materials of construction for the supports component types are:

- Aluminum
- Carbon Steel
- Concrete
- High Strength Low Alloy Steel (Bolting)
- Lubrite
- Stainless Steel

Environment

The supports component types are exposed to the following environments:

- Atmosphere/ Weather (Structural)
- Borated Water Leakage
- Plant Indoor Air (Structural)
- Submerged (Structural)

Aging Effects Requiring Management

The following supports aging effects require management:

- Cracking
- Increase in porosity and permeability, loss of strength
- Loss of material
- Loss of mechanical function
- Reduction in concrete anchor capacity

Aging Management Programs

The following aging management programs manage the aging effects for the supports component types:

- ASME Section XI, Subsection IWF (B2.1.29)
- Bolting Integrity (B2.1.7)
- Boric Acid Corrosion (B2.1.4)
- Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)
- Structures Monitoring Program (B2.1.32)

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation. For the containments, structures and component supports areas, those evaluations are addressed in the following subsections.

3.5.2.2.1 PWR and BWR Containments

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

Aggressive Chemical Attack:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

Corrosion of Embedded Steel:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

3.5.2.2.1.2 Cracks and Distortion due to Increased Stress Levels from Settlement; Reduction of Foundation Strength, Cracking, and Differential Settlement due to Erosion of Porous Concrete Subfoundations, if not Covered by the Structures Monitoring Program

Settlement

UFSAR Appendix 2.5.C discusses the geotechnical monitoring for the site. All ground movements have been found to correlate well with predicted values. After the expected initial heave and settlement, differential and total settlements have been acceptably small. The Structures Monitoring Program (B2.1.32) monitors settlement for all major structures. Therefore, further evaluation for the effects of settlement is not required.

Porous Concrete Subfoundations:

STP does not have porous concrete subfoundations. Therefore, further evaluation for this effect is not required.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

Elevated Temperatures:

This item is not applicable at STP. Penetrations and supports are designed so that concrete temperatures for the containment and its internal structures do not exceed 150°F for general areas or 200°F for local areas during long-term, accident, or short-term loading, as specified in ASME-ACI 359. If required, insulation and/or cooling systems are provided to limit the temperatures of the concrete to an acceptable level. (Reference UFSAR Sections 3.8.1.5.5, 3.8.3.1.8.1, and 3.8.3.4.6.) Therefore, further evaluation for reduction of strength and modulus of concrete structures due to elevated temperature is not required. Accessible concrete components are monitored by the ASME Section XI, Subsection IWL program (B2.1.28) to confirm the absence of any visible effects due to elevated temperatures.

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

Corrosion in inaccessible areas of steel containment liner:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Concrete mixes were designed in accordance with ACI 211.1-70. The ASME Section XI, Subsection IWL program (B2.1.28) identifies and manages any cracks in the concrete that could potentially provide a pathway for water to reach inaccessible portions of the steel containment liner. Procedural controls ensure that borated water spills are not common, and when detected are cleaned up in a timely manner. Therefore, further evaluation for corrosion in inaccessible areas of the steel containment liner is not required.

3.5.2.2.1.5 Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

Loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for PWR prestressed concrete containments and BWR Mark II prestressed concrete containments is a TLAA as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c).

The STP containment is a prestressed concrete pressure vessel with ungrouted tendons. Section 4.5 describes the evaluation of this TLAA.

3.5.2.2.1.6 Cumulative Fatigue Damage

Fatigue analyses and cyclic design limits of steel liners of prestressed concrete PWR containments and other steel elements such as penetration sleeves and penetration bellows are TLAAs as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c).

STP containment penetrations for the main steam, main feedwater, auxiliary feedwater, and steam generator blowdown penetrations; as well as the fuel transfer tube bellows are supported by TLAAs. Section 4.6.2 describes the evaluation of these TLAAs.

3.5.2.2.1.7 Cracking due to Stress Corrosion Cracking (SCC)

Cracking due to SCC is not an aging effect requiring management for STP stainless steel containment penetration sleeves, bellows, and dissimilar metal welds. Both high temperature (> 140°F) and exposure to an aggressive environment are required for SCC to be applicable. At STP, these two conditions are not simultaneously present for any stainless steel penetration sleeves, bellows, or dissimilar metal welds. Further, review of STP plant-specific operating experience did not identify any SCC of these components.

3.5.2.2.1.8 Cracking due to Cyclic Loading

Not applicable. Fatigue of metal components is a TLAA, evaluated in accordance with 10 CFR 54.21(c), so the applicable NUREG-1801 lines were not used.

3.5.2.2.1.9 Loss of Material (Scaling, Cracking. and Spalling) due to Freeze Thaw

Freeze-Thaw:

STP is located in a weathering region classified as “Negligible” according to Figure 1 of ASTM C33-07. Therefore, further evaluation for the effects of freeze-thaw is not required.

3.5.2.2.1.10 Cracking due to Expansion, and Reaction with Aggregate, and Increase in Porosity and Permeability due to Leaching of Calcium Hydroxide

Reaction with Aggregates

As noted in UFSAR Section 3.8.1.6.1.1(2), the potential reactivity of the aggregates was evaluated in accordance with the Appendix to ASTM C33-74. The results of the evaluation indicate that the aggregates may be potentially reactive and therefore, in accordance with Paragraphs 4.3 and 8.2 of ASTM C33-74 and current industry practice, a low-alkali cement was used. Accessible concrete components are monitored by the ASME Section XI, Subsection IWL program (B2.1.28) to confirm the absence of any visible effects due to reaction with aggregates. Therefore, further evaluation for the effects of reaction with aggregates is not required.

Leaching of Calcium Hydroxide:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. UFSAR Section 3.8.1.6.1.2 provides details of the concrete mixes, which were designed in accordance with ACI 211.1-70, therefore, further evaluation for the effects of leaching of calcium hydroxide is not required.

3.5.2.2.2 Safety-Related and Other Structures and Component Supports

3.5.2.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program

The following aging effects do not require further evaluation because the components are evaluated under the Structures Monitoring Program for all applicable structure groups.

- Corrosion of embedded steel
- Aggressive chemical attack
- Loss of material due to corrosion
- Reaction with aggregates
- Settlement

Further evaluation for lock up due to wear of sliding surfaces is not required because all in-scope sliding surfaces are evaluated under the Structures Monitoring Program (B2.1.28) or under the ASME Section XI, Subsection IWL program (B2.1.28).

Freeze-Thaw:

STP is located in a weathering region classified as “Negligible” according to Figure 1 of ASTM C33-07. Therefore, further evaluation for the effects of freeze-thaw is not required.

Porous Concrete Subfoundations:

STP does not have porous concrete subfoundations. Therefore, further evaluation for this effect is not required.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

3.5.2.2.2.2.1 Freeze-Thaw

Freeze-Thaw:

STP is located in a weathering region classified as “Negligible” according to Figure 1 of ASTM C33-07. Therefore, further evaluation for the effects of freeze-thaw is not required.

3.5.2.2.2.2.2 Reaction with Aggregates

Reaction with Aggregates

As noted in UFSAR Section 3.8.1.6.1.1(2), the potential reactivity of the aggregates was evaluated in accordance with the Appendix to ASTM C33-74. The results of the evaluation indicate that the aggregates may be potentially reactive and therefore, in accordance with Paragraphs 4.3 and 8.2 of ASTM C33-74 and current industry practice, a low-alkali cement was used. Accessible concrete components are monitored by the Structures Monitoring Program (B2.1.32) to confirm the absence of any visible effects due to reaction with aggregates. Therefore, further evaluation for the effects of reaction with aggregates is not required.

3.5.2.2.2.2.3 Settlement and settlement due to erosion of porous concrete subfoundations

Settlement:

UFSAR Appendix 2.5.C discusses the geotechnical monitoring for the site. All ground movements have been found to correlate well with predicted values. After the expected initial heave and settlement, differential and total settlements have been acceptably small. The Structures Monitoring Program (B2.1.32) continues to monitor settlement for all major structures. Therefore, further evaluation for the effects of settlement is not required.

Porous Concrete Subfoundations:

STP does not have porous concrete subfoundations. Therefore, further evaluation for this effect is not required.

3.5.2.2.2.2.4 Aggressive chemical attack and corrosion of embedded steel

Aggressive Chemical Attack:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

Corrosion of Embedded Steel:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

3.5.2.2.2.2.5 Leaching of Calcium Hydroxide

Leaching of Calcium Hydroxide:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. UFSAR Section 3.8.1.6.1.2 provides details of the concrete mixes, which were designed in accordance with ACI 211.1-70, therefore, further evaluation for the effects of leaching of calcium hydroxide is not required.

3.5.2.2.2.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

Elevated Temperatures:

This item is not applicable STP. Penetrations and supports are designed so that concrete temperatures do not exceed 150°F for general areas or 200°F for local areas during long-term, accident, or short-term loading, as specified in ASME-ACI 359. If required, insulation and/or cooling systems are provided to limit the temperatures of the concrete to an acceptable level. (Reference UFSAR Sections 3.8.3 and 9.4.) Concrete elements are not exposed to general temperatures above 150°F or local temperatures above 200°F. Penetration seals are designed to prevent heat from pipes or cables from raising the temperature of the surrounding concrete or masonry to above 200°F. Therefore, further evaluation for reduction of strength and modulus of concrete structures due to elevated temperature is not required. Accessible concrete components are monitored by the Structures Monitoring Program (B2.1.32) to confirm the absence of any visible effects due to elevated temperatures.

3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures

3.5.2.2.2.4.1 Aggressive chemical attack and corrosion of embedded steel

Aggressive Chemical Attack:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

Corrosion of Embedded Steel:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with Section CC-3534 of ASME-ACI 359. The groundwater chemistry at STP is monitored, and opportunistic inspections are performed whenever inaccessible concrete is exposed.

3.5.2.2.2.4.2 Freeze-Thaw

Freeze-Thaw:

STP is located in a weathering region classified as “Negligible” according to Figure 1 of ASTM C33-07. Therefore, further evaluation for the effects of freeze-thaw is not required.

3.5.2.2.2.4.3 Reaction with Aggregates and Leaching of Calcium Hydroxide

Reaction with Aggregates:

As noted in UFSAR Section 3.8.1.6.1.1(2), the potential reactivity of the aggregates was evaluated in accordance with the Appendix to ASTM C33-74. The results of the evaluation indicate that the aggregates may be potentially reactive and therefore, in accordance with Paragraphs 4.3 and 8.2 of ASTM C33-74 and current industry practice, a low-alkali cement was used. Accessible concrete components are monitored by the Structures Monitoring Program (B2.1.32) to confirm the absence of any visible effects due to reaction with aggregates. Therefore, further evaluation for the effects of reaction with aggregates is not required.

Leaching of Calcium Hydroxide:

Reinforced concrete structures at STP were designed, constructed, and inspected in accordance with ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. Procedural controls ensured quality throughout the batching, mixing, and placement processes. UFSAR Section 3.8 discusses the design requirements for each major structure. UFSAR Section 3.8.1.6.1.2 provides details of the concrete mixes, which were designed in accordance with ACI 211.1-70, therefore, further evaluation for the effects of leaching of calcium hydroxide is not required.

3.5.2.2.2.5 Cracking due to Stress Corrosion Cracking and Loss of Material due to Pitting and Crevice Corrosion

Not applicable. The in-scope tank liners at STP were evaluated as tanks with their mechanical systems and assigned NUREG-1801 lines from NUREG-1801, Chapters VII and VIII. Therefore, the NUREG-1801 lines from Chapter III were not used.

3.5.2.2.2.6 Aging of Supports Not Covered by the Structures Monitoring Program

Further evaluation of the following components is not required because they are inspected per the Structures Monitoring Program (B2.1.32):

- Building concrete around support anchorages
- HVAC duct supports
- Instrument supports
- Non-ASME mechanical equipment supports
- Non-ASME supports
- Electrical panels and enclosures

Further evaluation of vibration isolation elements is not required because there are no vibration isolation elements within the scope of license renewal at STP.

3.5.2.2.2.7 Cumulative Fatigue Damage due to Cyclic Loading

Analyses of fatigue in component support members, anchor bolts, and welds for Group B1.1, B1.2, and B1.3 component supports (for ASME III Class 1, 2, and 3 piping and components, and for Class MC BWR containment components) are TLAAs as defined in 10 CFR 54.3 only if a CLB fatigue analysis exists. TLAAs are evaluated in accordance with 10 CFR 54.21(c). The review identified no TLAAs supporting design of these components at STP.

STP ASME Class 1 piping is designed to code editions and addenda before 1986, which therefore precedes cycle limits for allowable stress in supports. Section 4.3.2.7 describes the absence of a cycle-based stress limit for ASME Class 1 supports.

STP ASME Class 2 and 3 piping and components require no fatigue or cycle design analysis for their supports, and no other similar analysis exist for supports for those components at STP.

STP is a PWR and does not have Class MC BWR containment supports.

3.5.2.2.3 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.5.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the containments, structures, and component supports component types. The section within Chapter 4, Time-Limited Aging Analyses, is indicated in parenthesis.

- Cumulative fatigue damage (Section 4.3, Metal Fatigue and Section 4.6.2, Fatigue Design of Containment Penetrations)
- Loss of prestress (Section 4.5, Concrete Containment Tendon Prestress)

3.5.3 Conclusions

The Containments, Structures and Component Supports component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the Containment, Structures and Component Supports component types are identified in the summary Tables and in Section 3.5.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the Containments, Structures and Component Supports component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.01	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment (as applicable)	Aging of accessible and inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	ISI (IWL) (B2.1.28) and for inaccessible concrete, an examination of representative samples of below-grade concrete, and periodic monitoring of groundwater, if the environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.1.1.
3.5.1.02	Concrete elements; All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program (B2.1.32). If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.1.2.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.03	Concrete elements: foundation, sub-foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program (B2.1.32). If a de-watering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Not applicable. STP has no porous concrete foundations, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.1.2.
3.5.1.04	Concrete elements: dome, wall, basemat, ring girder, buttresses, containment, concrete fill-in annulus (as applicable)	Reduction of strength and modulus of concrete due to elevated temperature	A plant-specific aging management program is to be evaluated	Yes	Not applicable. STP has no dome, wall, basemat, ring girder, buttresses, containment, or annulus concrete exposed to elevated temperatures, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.1.3.
3.5.1.05					Not applicable - BWR only

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.06	Steel elements: steel liner, liner anchors, integral attachments	Loss of material due to general, pitting and crevice corrosion	ISI (IWE) (B2.1.27), and 10 CFR Part 50, Appendix J (B2.1.30).	Yes, if corrosion is significant for inaccessible areas	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: ASME Section XI, Subsection IWE (B2.1.27). See further evaluation in Section 3.5.2.2.1.4.
3.5.1.07	Prestressed containment tendons	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Loss of prestress of containment tendons is a TLAA. See further evaluation in Section 3.5.2.2.1.5.
3.5.1.08					Not applicable - BWR only
3.5.1.09	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.5.2.2.1.6.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.10	Stainless steel penetration sleeves, penetration bellows, dissimilar metal welds	Cracking due to stress corrosion cracking	ISI (IWE) (B2.1.27), and 10 CFR Part 50, Appendix J (B2.1.30), and additional appropriate examinations/evaluations for bellows assemblies and dissimilar metal welds.	Yes	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: ASME Section XI, Subsection IWE (B2.1.27). See further evaluation in Section 3.5.2.2.1.7.
3.5.1.11					Not applicable - BWR only
3.5.1.12	Steel, stainless steel elements, dissimilar metal welds: penetration sleeves, penetration bellows; suppression pool shell, unbraced downcomers	Cracking due to cyclic loading	ISI (IWE) (B2.1.27), and 10 CFR Part 50, Appendix J (B2.1.30), and supplemented to detect fine cracks	Yes	Not applicable. Fatigue of metal components is a TLAA, evaluated in accordance with 10 CFR 54.21(c), so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.1.8.
3.5.1.13					Not applicable - BWR only

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.14	Concrete elements: dome, wall, basemat ring girder, buttresses, containment (as applicable)	Loss of material (Scaling, cracking, and spalling) due to freeze-thaw	ISI (IWL) (B2.1.28). Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.1.9.
3.5.1.15	Concrete elements: walls, dome, basemat, ring girder, buttresses, containment, concrete fill-in annulus (as applicable).	Cracking due to expansion and reaction with aggregate; increase in porosity, permeability due to leaching of calcium hydroxide	ISI (IWL) (B2.1.28) for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.1.10.
3.5.1.16	Seals, gaskets, and moisture barriers	Loss of sealing and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	ISI (IWE) (B2.1.27), and 10 CFR Part 50, Appendix J (B2.1.30).	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: ASME Section XI, Subsection IWE (B2.1.27).

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.17	Personnel airlock, equipment hatch and CRD hatch locks, hinges, and closure mechanisms	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanisms	10 CFR Part 50, Appendix J (B2.1.30) and Plant Technical Specifications	No	Consistent with NUREG-1801.
3.5.1.18	Steel penetration sleeves and dissimilar metal welds; personnel airlock, equipment hatch and CRD hatch	Loss of material due to general, pitting, and crevice corrosion	ISI (IWE) (B2.1.27), and 10 CFR Part 50, Appendix J (B2.1.30).	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: ASME Section XI, Subsection IWE (B2.1.27).
3.5.1.19					Not applicable - BWR only
3.5.1.20					Not applicable - BWR only
3.5.1.21					Not applicable - BWR only
3.5.1.22	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion	ISI (IWL) (B2.1.28)	No	Consistent with NUREG-1801.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.23	All Groups except Group 6: interior and above grade exterior concrete	Cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.
3.5.1.24	All Groups except Group 6: interior and above grade exterior concrete	Increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.
3.5.1.25	All Groups except Group 6: steel components: all structural steel	Loss of material due to corrosion	Structures Monitoring Program (B2.1.32). If protective coatings are relied upon to manage the effects of aging, the structures monitoring program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.26	All Groups except Group 6: accessible and inaccessible concrete: foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Structures Monitoring Program (B2.1.32). Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, if not within the scope of the applicant's structures monitoring program or for inaccessible areas of plants located in moderate to severe weathering conditions	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.
3.5.1.27	All Groups except Group 6: accessible and inaccessible interior/exterior concrete	Cracking due to expansion due to reaction with aggregates	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program or concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.28	Groups 1-3, 5-9: All	Cracks and distortion due to increased stress levels from settlement	Structures Monitoring Program (B2.1.32). If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.1.
3.5.1.29	Groups 1-3, 5-9: foundation	Reduction in foundation strength, cracking, differential settlement due to erosion of porous concrete subfoundation	Structures Monitoring Program (B2.1.32). If a de-watering system is relied upon for control of settlement, then the licensee is to ensure proper functioning of the de-watering system through the period of extended operation.	Yes, if not within the scope of the applicant's structures monitoring program or a de-watering system is relied upon	Not applicable. STP has no porous concrete foundations, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.2.1.
3.5.1.30	Group 4: Radial beam seats in BWR drywell; RPV support shoes for PWR with nozzle supports; Steam generator supports	Lock-up due to wear	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of ISI or structures monitoring program	Not applicable. STP did not use Lubrite on the RPV support shoes or steam generator supports, so the applicable NUREG-1801 line was not used. See further evaluation in Section 3.5.2.2.2.1

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.31	Groups 1-3, 5, 7-9: below-grade concrete components, such as exterior walls below grade and foundation	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)/ aggressive chemical attack;	Structures Monitoring Program (B2.1.32); Examination of representative samples of below-grade concrete, and periodic monitoring of groundwater, if the environment is non-aggressive. A plant specific program is to be evaluated if environment is aggressive.	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.2.4.
3.5.1.32	Groups 1-3, 5, 7-9: exterior above and below grade reinforced concrete foundations	Increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide	Structures Monitoring Program (B2.1.32) for accessible areas. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.2.5.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.33	Groups 1-5: concrete	Reduction of strength and modulus of concrete due to elevated temperature	A plant-specific aging management program is to be evaluated	Yes	Not applicable. Concrete elements at STP are not exposed to general temperatures above 150°F or local temperatures above 200°F, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.2.3.
3.5.1.34	Group 6: Concrete; all	Increase in porosity and permeability, cracking, loss of material due to aggressive chemical attack; cracking, loss of bond, loss of material due to corrosion of embedded steel	Inspection of Water-Control Structures (B2.1.33)	Yes	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.4.1.
3.5.1.35	Group 6: exterior above and below grade concrete foundation	Loss of material (spalling, scaling) and cracking due to freeze-thaw	Inspection of Water-Control Structures (B2.1.33)	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.4.2.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.36	Group 6: all accessible/ inaccessible reinforced concrete	Cracking due to expansion/ reaction with aggregates	Inspection of Water-Control Structures (B2.1.33)	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.4.3.
3.5.1.37	Group 6: exterior above and below grade reinforced concrete foundation interior slab	Increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide	Inspection of Water-Control Structures (B2.1.33)	Yes, if concrete was not constructed as stated for inaccessible areas	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.4.3.
3.5.1.38	Groups 7, 8: Tank liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated	Yes	Not applicable. The in-scope tank liners at STP were evaluated as tanks with their mechanical systems and assigned NUREG-1801 lines from Chapters VII and VIII. Therefore, the NUREG-1801 lines from chapter III were not used. See further evaluation in Section 3.5.2.2.2.5.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.39	Support members; welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.6.
3.5.1.40	Building concrete at locations of expansion and grouted anchors; grout pads for support base plates	Reduction in concrete anchor capacity due to local concrete degradation/ service-induced cracking or other concrete aging mechanisms	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program	Consistent with NUREG-1801. See further evaluation in Section 3.5.2.2.2.6.
3.5.1.41	Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Structures Monitoring Program (B2.1.32)	Yes, if not within the scope of the applicant's structures monitoring program	Not applicable. There are no vibration isolation elements in scope for license renewal at STP, so the applicable NUREG-1801 lines were not used. See further evaluation in Section 3.5.2.2.2.6.
3.5.1.42	Groups B1.1, B1.2, and B1.3: support members: anchor bolts, welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	Fatigue of metal components is a TLAA. See further evaluation in Section 3.5.2.2.2.7.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.43	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint shrinkage, creep, and aggressive environment	Masonry Wall Program (B2.1.31)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program. Fire Protection (B2.1.12) and Masonry Wall Program (B2.1.31) are credited.
3.5.1.44	Group 6 elastomer seals, gaskets, and moisture barriers	Loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants)	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801.
3.5.1.45	Group 6: exterior above and below grade concrete foundation; interior slab	Loss of material due to abrasion, cavitation	Inspection of Water-Control Structures (B2.1.33)	No	Consistent with NUREG-1801.
3.5.1.46	Group 5: Fuel pool liners	Cracking due to stress corrosion cracking; loss of material due to pitting and crevice corrosion	Water Chemistry (B2.1.2) and monitoring of spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels.	No	Consistent with NUREG-1801.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.47	Group 6: all metal structural members	Loss of material due to general (steel only), pitting and crevice corrosion	Inspection of Water-Control Structures (B2.1.33)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program. Structures Monitoring Program (B2.1.32) is credited.
3.5.1.48	Group 6: earthen water control structures - dams, embankments, reservoirs, channels, canals, and ponds	Loss of material, loss of form due to erosion, settlement, sedimentation, frost action, waves, currents, surface runoff, Seepage	Inspection of Water-Control Structures (B2.1.33)	No	Consistent with NUREG-1801.
3.5.1.49					Not applicable - BWR only
3.5.1.50	Groups B2, and B4: galvanized steel, aluminum, stainless steel support members; welds; bolted connections; support anchorage to building structure	Loss of material due to pitting and crevice corrosion	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 except for ASME Class 1 and 2 Supports, which are evaluated under ASME Section XI, Subsection IWF (B2.1.29)

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.51	Group B1.1: high strength low-alloy bolts	Cracking due to stress corrosion cracking; loss of material due to general corrosion	Bolting Integrity (B2.1.7)	No	Consistent with NUREG-1801 with aging management program exceptions. The aging management program(s) with exceptions to NUREG-1801 include: Bolting Integrity (B2.1.7)
3.5.1.52	Groups B2, and B4: sliding support bearings and sliding support surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801.
3.5.1.53	Groups B1.1, B1.2, and B1.3: support members: welds; bolted connections; support anchorage to building structure	Loss of material due to general and pitting corrosion	ISI (IWF) (B2.1.29)	No	Consistent with NUREG-1801.
3.5.1.54	Groups B1.1, B1.2, and B1.3: Constant and variable load spring hangers; guides; stops;	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF) (B2.1.29)	No	Consistent with NUREG-1801.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.55	Steel, galvanized steel, and aluminum support members; welds; bolted connections; support anchorage to building structure	Loss of material due to boric acid corrosion	Boric Acid Corrosion (B2.1.4)	No	Consistent with NUREG-1801.
3.5.1.56	Groups B1.1, B1.2, and B1.3: Sliding surfaces	Loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads	ISI (IWF) (B2.1.29)	No	Consistent with NUREG-1801.
3.5.1.57	Groups B1.1, B1.2, and B1.3: Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	ISI (IWF) (B2.1.29)	No	Not applicable. There are no vibration isolation elements in scope for license renewal at STP, so the applicable NUREG-1801 lines were not used.
3.5.1.58	Galvanized steel and aluminum support members; welds; bolted connections; support anchorage to building structure exposed to air - indoor uncontrolled	None	None	No	Consistent with NUREG-1801.

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Containments, Structures, and Component Supports (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.5.1.59	Stainless steel support members; welds; bolted connections; support anchorage to building structure	None	None	No	Consistent with NUREG-1801.

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Bellows	ES, SPB, SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	Cracking	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-2	3.5.1.10	B
Bellows	ES, SPB, SS	Stainless Steel	Submerged (Structural) (Ext)	Cracking	Water Chemistry (B2.1.2) and Monitoring of the Spent Fuel Pool Water Level	III.A5-13	3.5.1.46	C
Caulking and Sealant	SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing; Leakage through containment	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-7	3.5.1.16	B
Compressible Joints and Seals	SH, SPB	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing; Leakage through containment	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-7	3.5.1.16	B
Compressible Joints and Seals	SPB	Elastomer	Submerged (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A, 3
Concrete Block (Masonry Walls)	FB, SS	Concrete Block (Masonry Walls)	Plant Indoor Air (Structural) (Ext)	Cracking	Fire Protection (B2.1.12) and Masonry Wall Program (B2.1.31)	III.A1-11	3.5.1.43	E, 1

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-3	3.5.1.15	A
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	II.A1-5	3.5.1.02	A
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity, permeability	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-6	3.5.1.15	A
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-7	3.5.1.01	A
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, MB, SH, SLD, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SLD, SPB, SS	Concrete	Buried (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-2	3.5.1.14	A

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SLD, SPB, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-3	3.5.1.15	A
Concrete Elements	FLB, SH, SLD, SPB, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-4	3.5.1.01	A
Concrete Elements	FLB, SH, SLD, SPB, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	II.A1-5	3.5.1.02	A
Concrete Elements	FLB, SH, SLD, SPB, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity, permeability	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-6	3.5.1.15	A
Concrete Elements	FB, HLBS, MB, SH, SLD, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A4-2	3.5.1.27	A
Concrete Elements	FB, HLBS, MB, SH, SLD, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A4-4	3.5.1.24	A

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, HLBS, MB, SH, SLD, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A4-3	3.5.1.23	A
Concrete Elements	FB, HLBS, MB, SH, SLD, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, HLBS, MB, SH, SLD, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Fire Barrier Coatings and Wraps	FB	Fire Barrier (Cementitious Coating)	Plant Indoor Air (Structural) (Ext)	Loss of material, cracking	Fire Protection (B2.1.12)	None	None	J, 2
Fire Barrier Doors	FB	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B
Gate	SPB	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C
Gate	SPB	Stainless Steel	Submerged (Structural) (Ext)	Cracking	Water Chemistry (B2.1.2) and Monitoring of the Spent Fuel Pool Water Level	III.A5-13	3.5.1.46	A
Hatch - Auxiliary Airlock	SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of leak tightness	10 CFR Part 50, Appendix J (B2.1.30)	II.A3-5	3.5.1.17	A

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatch - Auxiliary Airlock	SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-6	3.5.1.18	B
Hatch - Equipment	SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of leak tightness	10 CFR Part 50, Appendix J (B2.1.30)	II.A3-5	3.5.1.17	A
Hatch - Equipment	SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-6	3.5.1.18	B
Hatch - Personnel Airlock	FB, SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of leak tightness	10 CFR Part 50, Appendix J (B2.1.30)	II.A3-5	3.5.1.17	A
Hatch - Personnel Airlock	FB, SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-6	3.5.1.18	B
Hatches and Plugs	MB	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A7-1	3.5.1.27	A
Hatches and Plugs	MB	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A7-5	3.5.1.26	A

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatches and Plugs	MB	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-8	3.5.1.23	A
Hatches and Plugs	MB	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-9	3.5.1.24	A
Liner Containment	SH, SPB	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Liner Containment	SH, SPB	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A1-11	3.5.1.06	B
Liner Refueling	SH, SPB	Stainless Steel	Encased in Concrete (Ext)	None	None	VII.J-17	3.3.1.96	C
Liner Refueling	SH, SPB	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C
Liner Refueling	SH, SPB	Stainless Steel	Submerged (Structural) (Ext)	Cracking	Water Chemistry (B2.1.2) and Monitoring of the Spent Fuel Pool Water Level	III.A5-13	3.5.1.46	A

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetration	SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-1	3.5.1.18	B
Penetration	SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Cumulative fatigue damage	Time-Limited Aging Analysis evaluated for the period of extended operation	II.A3-4	3.5.1.09	A
Penetration	SLD, SPB, SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	Cracking	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-2	3.5.1.10	B
Penetrations Electrical	SLD, SPB, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWE (B2.1.27) and 10 CFR Part 50, Appendix J (B2.1.30)	II.A3-1	3.5.1.18	B
Penetrations Electrical	SLD, SPB, SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C
Pipe Whip Restraints and Jet Shields	HLBS, MB, SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C

Table 3.5.2-1 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Containment Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Stairs, Platforms and Grates	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A4-5	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A4-5	3.5.1.25	A
Sump	SH	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C
Tendons	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of prestress	Time-Limited Aging Analysis evaluated for the period of extended operation	II.A1-9	3.5.1.07	A
Tendons	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-10	3.5.1.22	A
Tendons	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Tendons	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWL (B2.1.28)	II.A1-10	3.5.1.22	A
TSP Baskets	SH, SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C

Notes for Table 3.5.2-1:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

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

Plant Specific Notes:

1 NUREG-1801 does not provide a line in which concrete masonry is inspected per the Fire Protection program (B2.1.12).

2 NUREG-1801 does not provide a line in which fire barriers (ceramic fiber or cementitious coating) are inspected per the Fire Protection program (B2.1.12).

3 NUREG-1801 does not have this combination for the containment building, therefore, NUREG-1801, line III.A6-12 is used

Table 3.5.2-2 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Control Room

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A1-2	3.5.1.27	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A1-6	3.5.1.26	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A1-9	3.5.1.23	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A1-10	3.5.1.24	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FB, FLB, SH, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A1-2	3.5.1.27	A

Table 3.5.2-2 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Control Room (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, SH, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A1-9	3.5.1.23	A
Concrete Elements	FB, FLB, SH, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A1-10	3.5.1.24	A
Concrete Elements	FB, FLB, SH, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, FLB, SH, SPB, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Fire Barrier Coatings and Wraps	FB	Fire Barrier (Cementitious Coating)	Plant Indoor Air (Structural) (Ext)	Loss of material, cracking	Fire Protection (B2.1.12)	None	None	J, 1
Fire Barrier Doors	FB, SH, SPB	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A1-12	3.5.1.25	A
Fire Barrier Doors	FB, SH, SPB	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B

Table 3.5.2-2 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation - Control Room (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Gypsum and Plaster Barrier	SS	Gypsum/Plaster	Plant Indoor Air (Structural) (Ext)	Cracking	Structures Monitoring Program (B2.1.32)	None	None	J
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A1-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Mechanical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A1-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A1-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A1-12	3.5.1.25	A
Structural Steel	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C

Notes for Table 3.5.2-2:

Standard Note Text

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1	NUREG-1801 does not provide a line in which fire barriers (ceramic fiber or cementitious coating) are inspected per the Fire Protection program (B2.1.12).

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, loss of strength	Structures Monitoring Program (B2.1.32)	III.A3-7	3.5.1.32	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Doors	MB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Doors	FLB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-4	3.3.1.63	B
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B
Fire Barrier Seals	FB	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-2	3.3.1.61	B

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Hatch	MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatches and Plugs	FB, MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Hatches and Plugs	FB, MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Hatches and Plugs	FB, MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Hatches and Plugs	FB, MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Hatches and Plugs	FB, MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Hatches and Plugs	FB, MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations Electrical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Mechanical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C

Table 3.5.2-3 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Diesel Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Notes for Table 3.5.2-3:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

Plant Specific Notes:

None

Table 3.5.2-4 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Turbine Generator Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Concrete Elements	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A

Table 3.5.2-4 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Turbine Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Concrete Elements	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B

Table 3.5.2-4 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Turbine Generator Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Metal Siding	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Metal Siding	SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Notes for Table 3.5.2-4:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

Plant Specific Notes:

None

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Block (Masonry Walls)	FB, FLB, SH, SS	Concrete Block (Masonry Walls)	Plant Indoor Air (Structural) (Ext)	Cracking	Fire Protection (B2.1.12) and Masonry Wall Program (B2.1.31)	III.A3-11	3.5.1.43	E, 1
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, loss of strength	Structures Monitoring Program (B2.1.32)	III.A3-7	3.5.1.32	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Doors	FLB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Doors	FLB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Coatings and Wraps	FB	Fire Barrier (Cementitious Coating)	Plant Indoor Air (Structural) (Ext)	Loss of material, cracking	Fire Protection (B2.1.12)	None	None	J, 2
Fire Barrier Doors	FB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-4	3.3.1.63	B
Fire Barrier Doors	FB, FLB, MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, FLB, MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-2	3.3.1.61	B
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Gypsum and Plaster Barrier	FB, SH	Gypsum/ Plaster	Plant Indoor Air (Structural) (Ext)	Cracking	Fire Protection (B2.1.12)	None	None	J
Gypsum and Plaster Barrier	FB, SH	Gypsum/ Plaster	Plant Indoor Air (Structural) (Ext)	Cracking	Structures Monitoring Program (B2.1.32)	None	None	J
Hatch	MB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Hatch	FB, MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Hatch	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B
Hatches and Plugs	MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatches and Plugs	MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Hatches and Plugs	MB, SH	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Metal Siding	PR, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Siding	PR, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Mechanical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Roofing Membrane	SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Stairs, Platforms and Grates	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Table 3.5.2-5 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Mechanical-Electrical Auxiliary Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Notes for Table 3.5.2-5:
Standard Notes:

A Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
E Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
J Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Notes:

1 NUREG-1801 does not provide a line in which concrete masonry is inspected per the Fire Protection program (B2.1.12).
2 NUREG-1801 does not provide a line in which fire barriers (ceramic fiber or cementitious coating) are inspected per the Fire Protection program (B2.1.12).

Table 3.5.2-6 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Yard Areas and Buildings

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A

Table 3.5.2-6 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Yard Areas and Buildings (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A

Table 3.5.2-6 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Yard Areas and Buildings (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Doors	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B

Table 3.5.2-6 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Yard Areas and Buildings (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Gypsum and Plaster Barrier	SH	Gypsum/Plaster	Plant Indoor Air (Structural) (Ext)	Cracking	Structures Monitoring Program (B2.1.32)	None	None	J
Metal Siding	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Metal Siding	SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C

Table 3.5.2-6 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Miscellaneous Yard Areas and Buildings (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations Mechanical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Metals	SH, SS	Aluminum	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B4-7	3.5.1.50	C
Structural Metals	SH, SS	Aluminum	Plant Indoor Air (Structural) (Ext)	None	None	III.B4-4	3.5.1.58	C
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Notes for Table 3.5.2-6:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Notes:

None

Table 3.5.2-7 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Electrical Foundations and Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES	Elastomer	Encased in Concrete (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A

Table 3.5.2-7 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Electrical Foundations and Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, MB, SH, SPB, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A

Table 3.5.2-7 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Electrical Foundations and Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Duct Banks and Manholes	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Duct Banks and Manholes	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A3-6	3.5.1.26	A
Duct Banks and Manholes	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Duct Banks and Manholes	SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Duct Banks and Manholes	SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Duct Banks and Manholes	SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A3-3	3.5.1.28	A

Table 3.5.2-7 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Electrical Foundations and Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Duct Banks and Manholes	SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-4	3.5.1.31	A
Duct Banks and Manholes	SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-5	3.5.1.31	A
Duct Banks and Manholes	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A3-2	3.5.1.27	A
Duct Banks and Manholes	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-9	3.5.1.23	A
Duct Banks and Manholes	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A3-10	3.5.1.24	A
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Table 3.5.2-7 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Electrical Foundations and Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Transmission Tower	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A3-12	3.5.1.25	A

Notes for Table 3.5.2-7:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

Plant Specific Notes:

None

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH, SPB	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	SH, SPB	Elastomer	Submerged (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Compressible Joints and Seals	ES	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A5-2	3.5.1.27	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A5-6	3.5.1.26	A

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-9	3.5.1.23	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-10	3.5.1.24	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A5-2	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A5-3	3.5.1.28	A

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-4	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-5	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, loss of strength	Structures Monitoring Program (B2.1.32)	III.A5-7	3.5.1.32	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A5-2	3.5.1.27	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-9	3.5.1.23	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-10	3.5.1.24	A

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B
Doors	SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Doors	FLB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Fire Barrier Coatings and Wraps	FB	Fire Barrier (Cementitious Coating)	Plant Indoor Air (Structural) (Ext)	Loss of material, cracking	Fire Protection (B2.1.12)	None	None	J, 1
Fire Barrier Seals	FB	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-2	3.3.1.61	B
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Gate	SPB	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Gate	SPB	Stainless Steel	Submerged (Structural) (Ext)	Cracking	Water Chemistry (B2.1.2) and Monitoring of the Spent Fuel Pool Water Level	III.A5-13	3.5.1.46	A
Hatch	MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A5-2	3.5.1.27	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-9	3.5.1.23	A
Hatches and Plugs	MB, SH	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A5-10	3.5.1.24	A
Liner Spent Fuel Pool	SPB	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C
Liner Spent Fuel Pool	SPB	Stainless Steel	Submerged (Structural) (Ext)	Cracking	Water Chemistry (B2.1.2) and Monitoring of the Spent Fuel Pool Water Level	III.A5-13	3.5.1.46	A

Table 3.5.2-8 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Fuel Handling Building (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Penetrations Electrical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Mechanical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Stairs, Platforms and Grates	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A5-12	3.5.1.25	A

Notes for Table 3.5.2-8:

Standard Note Text

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

Plant Specific Note:

1	NUREG-1801 does not provide a line in which fire barriers (ceramic fiber or cementitious coating) are inspected per the Fire Protection program (B2.1.12).

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Barrier	HS, SCW, SH	Earthfill (rip-rap, stone, soil)	Atmosphere/ Weather (Structural) (Ext)	Loss of material, loss of form	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-9	3.5.1.48	A
Barrier	HS, SCW, SH	Earthfill (rip-rap, stone, soil)	Submerged (Structural) (Ext)	Loss of material, loss of form	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-9	3.5.1.48	A
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-1	3.5.1.34	A

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-2	3.5.1.36	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-5	3.5.1.35	A
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B
Concrete Elements	FB, FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-2	3.5.1.36	A

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-3	3.5.1.34	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A6-4	3.5.1.28	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-1	3.5.1.34	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-2	3.5.1.36	A
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-28	3.3.1.65	B
Concrete Elements	FB, FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-29	3.3.1.67	B

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Submerged (Structural) (Ext)	Increase in porosity and permeability, loss of strength	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-6	3.5.1.37	A
Concrete Elements	FLB, SH, SS	Concrete	Submerged (Structural) (Ext)	Loss of material	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-7	3.5.1.45	A
Doors	FLB, MB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Doors	FLB, MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Fire Barrier Doors	FB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12)	VII.G-3	3.3.1.63	B
Fire Barrier Seals	FB	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Fire Barrier Seals	FB	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-2	3.3.1.61	B

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Fire Barrier Seals	FB	Elastomer	Plant Indoor Air (Structural) (Ext)	Increased hardness, shrinkage and loss of strength	Fire Protection (B2.1.12)	VII.G-1	3.3.1.61	B
Hatches and Plugs	FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-1	3.5.1.34	A
Hatches and Plugs	FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-2	3.5.1.36	A
Hatches and Plugs	FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-5	3.5.1.35	A
Hatches and Plugs	FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Concrete cracking and spalling	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-30	3.3.1.66	B

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatches and Plugs	FLB, MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Fire Protection (B2.1.12) and Structures Monitoring Program (B2.1.32)	VII.G-31	3.3.1.67	B
Hatches and Plugs	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-1	3.5.1.34	A
Hatches and Plugs	SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-2	3.5.1.36	A
Penetrations Electrical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Penetrations Electrical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Penetrations Electrical	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Penetrations Mechanical	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Penetrations Mechanical	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C

Table 3.5.2-9 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Essential Cooling Water Structures (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Structural Steel	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C
Structural Steel	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Structural Steel	SS	Carbon Steel	Submerged (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Structural Steel	SH	Stainless Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A6-11	3.5.1.47	E, 1
Structural Steel	SH	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	VII.J-15	3.3.1.94	C

Notes for Table 3.5.2-9:

Standard Notes:

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

B Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.

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

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

Plant Specific Note:

1 NUREG-1801, line III.A6-11 specifies Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants as the program for metal components in water-control structures. Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33) does not address metal components, so the Structures Monitoring Program (B2.1.32) is used.

Table 3.5.2-10 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Feedwater Storage Tank Foundation and Shell

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Caulking and Sealant	FLB, SH	Elastomer	Atmosphere/ Weather (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB	Elastomer	Buried (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Caulking and Sealant	FLB, SH	Elastomer	Plant Indoor Air (Structural) (Ext)	Loss of sealing	Structures Monitoring Program (B2.1.32)	III.A6-12	3.5.1.44	A
Concrete Elements	MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A7-1	3.5.1.27	A
Concrete Elements	MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Loss of material (spalling, scaling) and cracking	Structures Monitoring Program (B2.1.32)	III.A7-5	3.5.1.26	A
Concrete Elements	MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-8	3.5.1.23	A
Concrete Elements	MB, SH, SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-9	3.5.1.24	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A7-1	3.5.1.27	A

Table 3.5.2-10 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Feedwater Storage Tank Foundation and Shell (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracks and distortion	Structures Monitoring Program (B2.1.32)	III.A7-2	3.5.1.28	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-3	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Buried (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-4	3.5.1.31	A
Concrete Elements	FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking due to expansion	Structures Monitoring Program (B2.1.32)	III.A7-1	3.5.1.27	A
Concrete Elements	FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Cracking, loss of bond, and loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-8	3.5.1.23	A
Concrete Elements	FLB, SH, SS	Concrete	Plant Indoor Air (Structural) (Ext)	Increase in porosity and permeability, cracking, loss of material (spalling, scaling)	Structures Monitoring Program (B2.1.32)	III.A7-9	3.5.1.24	A

Table 3.5.2-10 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Auxiliary Feedwater Storage Tank Foundation and Shell (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Hatch	MB, SH	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A7-10	3.5.1.25	A
Hatch	MB, SH	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.A7-10	3.5.1.25	A
Structural Steel	SS	Carbon Steel	Encased in Concrete (Ext)	None	None	VII.J-21	3.3.1.96	C

Notes for Table 3.5.2-10:

Standard Notes:

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

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

Plant Specific Notes:

None

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Cable Trays and Supports	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Cable Trays and Supports	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Cable Trays and Supports	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Cable Trays and Supports	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Conduit And Supports	FB, SH, SS	Aluminum	Plant Indoor Air (Structural) (Ext)	None	None	III.B2-4	3.5.1.58	A
Conduit And Supports	SH, SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Conduit And Supports	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Conduit And Supports	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Conduit And Supports	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Electrical Panels and Enclosures	SH, SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B3-7	3.5.1.39	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Electrical Panels and Enclosures	SH, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B3-7	3.5.1.39	A
Electrical Panels and Enclosures	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B3-1	3.5.1.40	A
Electrical Panels and Enclosures	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B3-1	3.5.1.40	A
High Strength Bolting	SS	High Strength Low Alloy Steel (Bolting)	Plant Indoor Air (Structural) (Ext)	Cracking	Bolting Integrity (B2.1.7)	III.B1.1-3	3.5.1.51	B
High Strength Bolting	SS	High Strength Low Alloy Steel (Bolting)	Plant Indoor Air (Structural) (Ext)	Loss of material	Bolting Integrity (B2.1.7)	III.B1.1-4	3.5.1.51	B
Instrument Panels and Racks	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B3-7	3.5.1.39	A
Instrument Panels and Racks	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B3-7	3.5.1.39	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Instrument Panels and Racks	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B3-1	3.5.1.40	A
Instrument Panels and Racks	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B3-1	3.5.1.40	A
Supports	ES, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of mechanical function	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.1-2	3.5.1.54	A
Supports	ES, SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of mechanical function	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.2-2	3.5.1.54	A
Supports	ES, SS	Lubrite	Plant Indoor Air (Structural) (Ext)	Loss of mechanical function	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.1-5	3.5.1.56	A
Supports	ES, SS	Lubrite	Plant Indoor Air (Structural) (Ext)	Loss of mechanical function	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.2-3	3.5.1.56	A
Supports	ES, SS	Lubrite	Plant Indoor Air (Structural) (Ext)	Loss of mechanical function	Structures Monitoring Program (B2.1.32)	III.B2-2	3.5.1.52	A
Supports ASME 1	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B1.1-14	3.5.1.55	A
Supports ASME 1	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.1-13	3.5.1.53	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports ASME 1	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B1.1-1	3.5.1.40	A
Supports ASME 1	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B1.1-10	3.5.1.59	A
Supports ASME 1	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B1.1-9	3.5.1.59	A
Supports ASME 2 and 3	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.2-10	3.5.1.53	A
Supports ASME 2 and 3	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B1.2-11	3.5.1.55	A
Supports ASME 2 and 3	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.2-10	3.5.1.53	A
Supports ASME 2 and 3	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B1.2-1	3.5.1.40	A
Supports ASME 2 and 3	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B1.2-1	3.5.1.40	A
Supports ASME 2 and 3	SS	Stainless Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B4-7	3.5.1.50	E, 1
Supports ASME 2 and 3	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B1.2-8	3.5.1.59	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports ASME 2 and 3	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B1.2-7	3.5.1.59	A
Supports HVAC Duct	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports HVAC Duct	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports HVAC Duct	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Supports HVAC Duct	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Supports HVAC Duct	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B2-8	3.5.1.59	A
Supports Instrument	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports Instrument	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B2-11	3.5.1.55	A
Supports Instrument	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports Instrument	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports Instrument	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Supports Instrument	SS	Stainless Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B4-7	3.5.1.50	A
Supports Instrument	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B2-9	3.5.1.59	A
Supports Instrument	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B2-8	3.5.1.59	A
Supports Insulation	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B2-8	3.5.1.59	A
Supports Mech Equip Class 1	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B1.1-14	3.5.1.55	A
Supports Mech Equip Class 1	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.1-13	3.5.1.53	A
Supports Mech Equip Class 1	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B4-1	3.5.1.40	A
Supports Mech Equip Class 1	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B1.1-10	3.5.1.59	A
Supports Mech Equip Class 1	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B1.1-9	3.5.1.59	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports Mech Equip Class 2 and 3	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B1.2-11	3.5.1.55	A
Supports Mech Equip Class 2 and 3	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	ASME Section XI, Subsection IWF (B2.1.29)	III.B1.2-10	3.5.1.53	A
Supports Mech Equip Class 2 and 3	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B4-1	3.5.1.40	A
Supports Mech Equip Class 2 and 3	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B1.2-8	3.5.1.59	A
Supports Mech Equip Class 2 and 3	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B1.2-7	3.5.1.59	A
Supports Mech Equip Non ASME	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B4-10	3.5.1.39	A
Supports Mech Equip Non ASME	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B2-11	3.5.1.55	A
Supports Mech Equip Non ASME	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B4-10	3.5.1.39	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports Mech Equip Non ASME	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B4-1	3.5.1.40	A
Supports Mech Equip Non ASME	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B4-1	3.5.1.40	A
Supports Mech Equip Non ASME	SS	Concrete	Submerged (Structural) (Ext)	Increase in porosity and permeability, loss of strength	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-6	3.5.1.37	A
Supports Mech Equip Non ASME	SS	Concrete	Submerged (Structural) (Ext)	Loss of material	Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B2.1.33)	III.A6-7	3.5.1.45	A
Supports Mech Equip Non ASME	SS	Stainless Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B4-7	3.5.1.50	A
Supports Mech Equip Non ASME	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B4-9	3.5.1.59	A
Supports Mech Equip Non ASME	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B4-8	3.5.1.59	A

Table 3.5.2-11 Containments, Structures, and Component Supports – Summary of Aging Management Evaluation – Supports (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports Mech Equip Non ASME	SS	Stainless Steel	Submerged (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	None	None	J
Supports Non ASME	SS	Carbon Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports Non ASME	SS	Carbon Steel	Borated Water Leakage (Ext)	Loss of material	Boric Acid Corrosion (B2.1.4)	III.B4-11	3.5.1.55	A
Supports Non ASME	SS	Carbon Steel	Plant Indoor Air (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-10	3.5.1.39	A
Supports Non ASME	SS	Concrete	Atmosphere/ Weather (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Supports Non ASME	SS	Concrete	Plant Indoor Air (Structural) (Ext)	Reduction in concrete anchor capacity	Structures Monitoring Program (B2.1.32)	III.B2-1	3.5.1.40	A
Supports Non ASME	SS	Stainless Steel	Atmosphere/ Weather (Structural) (Ext)	Loss of material	Structures Monitoring Program (B2.1.32)	III.B2-7	3.5.1.50	A
Supports Non ASME	SS	Stainless Steel	Borated Water Leakage (Ext)	None	None	III.B2-9	3.5.1.59	A
Supports Non ASME	SS	Stainless Steel	Plant Indoor Air (Structural) (Ext)	None	None	III.B2-8	3.5.1.59	A

<u>Notes for Table 3.5.2-11:</u>

<u>Standard Notes:</u>

A	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging management program.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

<u>Plant Specific Notes:</u>

1	NUREG-1801 does not provide a line to evaluate stainless steel components outdoors under the ASME Section XI, Subsection IWF program (B2.1.29).

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS

3.6.1 Introduction

Section 3.6 provides the results of the aging management reviews (AMRs) for those component types identified in Section 2.5, Scoping and Screening Results – Electrical and Instrument and Control Systems, subject to AMR. The electrical component types subject to AMR are discussed in the following sections:

- Cable connections (metallic parts)
- Connector (exposed to borated water)
- High voltage insulators
- Insulated cable and connections (includes the following):
  - Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements
  - Inaccessible medium-voltage electrical cables not subject to 10 CFR 50.49 EQ requirements
- Metal enclosed bus (including the following):
  - Non-Segregated Phase metal enclosed bus
    - Bus bar and connections
    - Bus enclosure
    - Bus insulation and insulators
  - Isolated Phase metal enclosed bus
    - Bus bar
    - Bus enclosure
    - Bus insulators
- Switchyard bus and connections
- Transmission conductors and connections
- Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements

Table 3.6.1, Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components, provides the summary of the programs evaluated in NUREG-1801 that are applicable to component types in this Section. Table 3.6.1 uses the format of Table 1 described in Section 3.0.

3.6.2 Results

The following table summarizes the results of the AMR for the component types in the Electrical and Instrumentation and Controls area.

- Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components

This table uses the format of Table 2 discussed in Section 3.0.

3.6.2.1 Materials, Environment, Aging Effects Requiring Management and Aging Management Programs

The materials from which the component types are fabricated, the environments to which they are exposed, the potential aging effects requiring management, and the aging management programs used to manage these aging effects are provided for each of the above electrical component commodities in the following subsections.

3.6.2.1.1 Cable Connections (metallic parts)

Materials

The material of construction for the cable connections (metallic parts) is:

- Various Metals Used For Electrical Contacts

Environment

The cable connections (metallic parts) are exposed to the following environments:

- Atmosphere/ Weather (Ext)
- Plant Indoor Air

Aging Effects Requiring Management

The following cable connections (metallic parts) aging effect requires management:

- Loosening of bolted connections

Aging Management Programs

The following aging management program manages the aging effects for the cable connections (metallic parts):

- Electrical Cable Connections Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.36)

3.6.2.1.2 Connectors (exposed to borated water)

Materials

The material of construction for the connectors is:

- Various Metals Used For Electrical Contacts

Environment

The connectors are exposed to the following environment:

- Borated Water Leakage

Aging Effects Requiring Management

The following connectors aging effect requires management:

- Corrosion of Connector Contact Surfaces

Aging Management Programs

The following aging management program manages the aging effects for the connectors:

- Boric Acid Corrosion (B2.1.4)

3.6.2.1.3 High Voltage Insulators

Materials

The materials of construction for the high voltage insulators are:

- Carbon Steel (Galvanized)
- Cement (Electrical Insulators)
- Porcelain

Environment

The high voltage insulators are exposed to the following environment:

- Atmosphere/ Weather (Ext)

Aging Effects Requiring Management

The following high voltage insulator aging effect requires management:

- None

Aging Management Programs

The following aging management program manages the aging effects for the high voltage insulators:

- None

3.6.2.1.4 Insulated Cables and Connections

3.6.2.1.4.1 Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements

Materials

The material of construction for the electrical cable and connections not subject to 10 CFR 50.49 EQ requirements is:

- Various Organic Polymers

Environment

The electrical cable and connections not subject to 10 CFR 50.49 EQ requirements are exposed to the following environment:

- Adverse Localized Environment

Aging Effects Requiring Management

The following electrical cable and connections not subject to 10 CFR 50.49 EQ requirements aging effects require management:

- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure

Aging Management Programs

The following aging management program manages the aging effects for the cable and connections not subject to 10 CFR 50.49 EQ requirements:

- Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.24)

3.6.2.1.4.2 Inaccessible Medium Voltage Electrical Cables not subject to 10 CFR 50.49 EQ requirements

Materials

The material of construction for the inaccessible medium voltage electrical cables not subject to 10 CFR 50.49 EQ requirements is:

- Various Organic Polymers

Environment

The inaccessible medium voltage electrical cables not subject to 10 CFR 50.49 EQ requirements are exposed to the following environment:

- Adverse Localized Environment

Aging Effects Requiring Management

The following inaccessible medium voltage electrical cables not subject to 10 CFR 50.49 EQ requirements aging effects require management:

- Localized damage and breakdown of insulation leading to electrical failure

Aging Management Programs

The following aging management program manages the inaccessible medium voltage electrical cables not subject to 10 CFR 50.49 EQ requirements:

- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.25)

3.6.2.1.5 Metal Enclosed Bus

Materials

The materials of construction for metal enclosed bus are:

- Aluminum

- Carbon Steel
- Carbon Steel (Galvanized)
- Elastomer
- Porcelain
- Various Insulation Material (Electrical)
- Various Metals Used for Electrical Contacts

Environment

Metal enclosed bus is exposed to the following environments:

- Atmosphere/ Weather
- Plant Indoor Air

Aging Effects Requiring Management

The following metal enclosed bus aging effects require management:

- Loosening of bolted connections
- Loss of material
- Hardening and loss of strength
- Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure

Aging Management Programs

The following aging management program manages the metal enclosed bus:

- Metal Enclosed Bus (B2.1.26)

3.6.2.1.6 Switchyard Bus and Connections

Materials

The material of construction for the switchyard bus and connections is:

- Aluminum
- Carbon Steel (Galvanized)

Environment

The switchyard bus and connections are exposed to the following environment:

- Atmosphere/ Weather (Ext)

Aging Effects Requiring Management

The following switchyard bus and connections aging effect requires management:

- None

Aging Management Programs

The following aging management program manages the switchyard bus and connections:

- None

3.6.2.1.7 Transmission Conductors and Connections

Materials

The material of construction for the transmission conductors and connections is:

- Aluminum
- Carbon Steel (Galvanized)

Environment

The transmission conductors and connections are exposed to the following environment:

- Atmosphere/ Weather

Aging Effects Requiring Management

The following transmission conductors and connections aging effects require management:

- None

Aging Management Programs

The following aging management program manages the aging effects for the transmission conductors and connections:

- None

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

NUREG-1801 provides the basis for identifying those programs that warrant further evaluation. For the electrical and control systems, those evaluations are addressed in the following subsections.

3.6.2.2.1 Electrical Equipment Subject to Environmental Qualification

Environmental qualification (EQ) is a TLAA as defined in 10 CFR 54.3 and is evaluated in accordance with 10 CFR 54.21(c)(1). The STP EQ program meets requirements of 10 CFR 50.49. Section 4.4 describes the 10 CFR 54.21(c)(1) TLAA evaluation of electrical equipment subject to 10 CFR 50.49 environmental qualification requirements.

3.6.2.2.2 Degradation of Insulator Quality due to Presence of Any Salt Deposits and Surface Contamination, and Loss of Material due to Mechanical Wear

STP is located in an area with moderate rainfall and where the outdoor environment is not subject to industry air pollution or salt spray. Contamination buildup on the high-voltage insulators is not a problem due to sufficient rainfall periodically washing the insulators. Additionally there is no salt spray at the plant since the plant is not located near the ocean. Degradation of insulator quality in the absence of salt deposits and surface contamination is not an aging effect requiring management.

Industry experience has shown that transmission conductors are designed and installed not to swing significantly and cause wear due to wind induced abrasion and fatigue. The STP transmission conductors are designed and installed not to swing significantly and cause wear due to wind induced abrasion and fatigue. Therefore, loss of material due to wind induced abrasion and fatigue is not an applicable aging effect requiring management.

The STP outdoor environment is not subject to industry air pollution or saline environment. STP experienced a number of instances of flashover events early in plant life due to lime deposits from heavy dust during construction. Frequent washdowns of insulators were conducted to reduce the occurrence of flashover. With the application of silicone insulator coatings, the flashover events have been eliminated. Walkdowns are conducted to ensure the continuing effectiveness of the silicon coatings.

STP has identified no instances of loss of material on high voltage insulators due to mechanical wear. Two instances have occurred where chips have broken off insulator skirts. In neither instance was the insulating function or strength of the insulator affected.

3.6.2.2.3 Loss of Material due to Wind Induced Abrasion and Fatigue, Loss of Conductor Strength due to Corrosion, and Increased Resistance of Connection due to Oxidation or Loss of Pre-load

Industry experience has shown that transmission conductors are designed and installed not to swing significantly and cause wear due to wind induced abrasion and fatigue. Therefore, loss of material due to wind induced abrasion and fatigue is not an applicable aging effect requiring management for the period of extended operation.

The most prevalent mechanism contributing to loss of conductor strength is corrosion. Corrosion rates depend largely on air quality, which involves suspended particles in the air, SO_2 concentration, rain, fog chemistry, and other weather conditions. The STP environment is not subject to industrial or salt pollution. UFSAR Section 2.3.2.2.2 shows that there is a low frequency and duration (120 hr/yr) of fog at the STP site.

The IEEE Transactions on Power Delivery contain a two part paper on aged ACSR (aluminum core, steel reinforced) conductors, commonly referred to as the Ontario Hydro Study. In testing (Part I) the study found that even with heavy contamination, the aluminum wires were in good condition.

Part II of the Ontario Hydro Study concentrates on prediction of remaining life of ACSR cable. Laboratory testing consistently showed that, for ACSR cable, aluminum was found to have retained its original properties, for the most part, while the steel components showed reductions in tensile strength. The data also indicates that the reduction in strength was almost solely in the steel wires. The study concludes that, for ACSR cable, a mean useful life of 70 years is valid. The all aluminum conductors at STP are not subject to either severe corrosion or reduction in tensile strength due to aging. Therefore, corrosion is not a credible aging effect that requires management for the period of extended operation.

The STP outdoor environment is not subject to industry air pollution or saline environment. Aluminum bus material, galvanized steel support hardware and aluminum connection material do not experience any appreciable aging effects in this environment. Transmission conductor and switchyard bus connections at the time of installation are treated with corrosion inhibitors to avoid connection oxidation and torqued to avoid loss of pre-load. Based on temperature data in the UFSAR Table 2.3-21, the transmission connections and switchyard bus do not experience thermal cycling. The transmission connections and switchyard bus are subject to average monthly temperatures ranging from 81º F in July to 53º F in January with minimal ohmic heating. Therefore, increased resistance of connections due to thermal cycling is not an aging effect requiring management for the period of extended operation.

Connection configuration includes stainless steel Belleville washers that are torqued to preclude loss of pre-load. These connections are periodically evaluated via thermography as part of the preventive maintenance activities. The periodic thermography will continue into the period of extended operation. Therefore, increased resistance of connections due to oxidation or loss of pre-load is not an aging effect requiring management for the period of extended operation.

3.6.2.2.4 Quality Assurance for Aging Management of Nonsafety-Related Components

Quality Assurance Program and Administrative Controls are discussed in Section B1.3.

3.6.2.3 Time-Limited Aging Analysis

The time-limited aging analyses identified below are associated with the electrical and instrument and controls component types. The section within Chapter 4, Time-Limited Aging Analyses, is indicated in parenthesis.

- Environmental Qualification of Electrical and Instrumentation and Control Equipment (Section 4.4, Environmental Qualification of Electric Equipment)

3.6.3 Conclusions

The Electrical and Instrument and Controls component types that are subject to AMR have been evaluated. The aging management programs selected to manage the aging effects for the Electrical and Instrument and Controls component types are identified in the summary Tables and in Section 3.6.2.1.

A description of these aging management programs is provided in Appendix B, along with a demonstration that the identified aging effects will be managed for the period of extended operation.

Therefore, based on the demonstration provided in Appendix B, the effects of aging associated with the Electrical and Instrument and Controls component types will be adequately managed so that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis during the period of extended operation.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1.01	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	Environmental Qualification of Electric Components (B3.2)	Yes, TLAA	Environmental qualification of electric components is a TLAA. See further evaluation in Section 3.6.2.2.1.
3.6.1.02	Electrical cables, connections and fuse holders (insulation) not subject to 10 CFR 50.49 EQ requirements	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.24)	No	Consistent with NUREG-1801.
3.6.1.03	Conductor insulation for electrical cables and connections used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance (IR)	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Electrical Cables and Connections Used in Instrumentation Circuits Not Subject to 10 CFR 50.49 EQ Requirements	No	Not applicable. All electrical cables and connections used in high voltage instrumentation circuits that support license renewal intended functions are subject to 10 CFR 50.49 EQ requirements and are managed by the Environmental Qualification (EQ) of Electrical Components program (B3.2)

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1.04	Conductor insulation for inaccessible medium voltage (2 kV to 35 kV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	Localized damage and breakdown of insulation leading to electrical failure due to moisture intrusion, water trees	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.25)	No	Consistent with NUREG-1801.
3.6.1.05	Connector contacts for electrical connectors exposed to borated water leakage	Corrosion of connector contact surfaces due to intrusion of borated water	Boric Acid Corrosion (B2.1.4)	No	Consistent with NUREG 1801.
3.6.1.06	Fuse Holders (Not Part of a Larger Assembly): Fuse holders – metallic clamp	Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation	Fuse Holders	No	Not applicable. All fuse holders including the fuses installed for electrical penetration protection are part of larger assemblies.
3.6.1.07	Metal enclosed bus - Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Metal Enclosed Bus (B2.1.26)	No	Consistent with NUREG-1801.
3.6.1.08	Metal enclosed bus – Insulation/insulators	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Metal Enclosed Bus (B2.1.26)	No	Consistent with NUREG-1801.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1.09	Metal enclosed bus – Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Metal Enclosed Bus (B2.1.26) is credited.
3.6.1.10	Metal enclosed bus – Enclosure assemblies	Hardening and loss of strength due to elastomers degradation	Structures Monitoring Program (B2.1.32)	No	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program Metal Enclosed Bus (B2.1.26) is credited.
3.6.1.11	High voltage insulators	Degradation of insulation quality due to presence of any salt deposits and surface contamination, Loss of material caused by mechanical wear due to wind blowing on transmission conductors	A plant-specific aging management program is to be evaluated.	Yes	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable. See further evaluation in Section 3.6.2.2.2.
3.6.1.12	Transmission conductors and connections, Switchyard bus and connections	Loss of material due to wind induced abrasion and fatigue, Loss of conductor strength due to corrosion, Increased resistance of connection due to oxidation or loss of preload	A plant-specific aging management program is to be evaluated.	Yes	Exception to NUREG-1801. Aging effect in NUREG-1801 for this material and environment combination is not applicable. See further evaluation in Section 3.6.2.2.3.

Table 3.6.1 Summary of Aging Management Evaluations in Chapter VI of NUREG-1801 for Electrical Components (Continued)

Item Number	Component Type	Aging Effect / Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.6.1.13	Cable Connections – Metallic parts	Loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B2.1.36)	No	Consistent with NUREG-1801.
3.6.1.14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	NA - No AEM or AMP	Not applicable. All fuse holders including the fuses installed for electrical penetration protection are part of larger assemblies.

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10 CFR 50.49 Electrical Equipment	EC, IN	Various Organic Polymers	Adverse Localized Environment (Ext)	Various degradation	Time-Limited Aging Analysis evaluated for the period of extended operation	VI.B-1	3.6.1.01	A
Cable Connections (Metallic Parts)	EC	Various Metals Used for Electrical Contacts	Atmosphere/ Weather (Ext)	Loosening of bolted connections	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B2.1.36)	VI.A-1	3.6.1.13	A
Cable Connections (Metallic Parts)	EC	Various Metals Used for Electrical Contacts	Plant Indoor Air (Ext)	Loosening of bolted connections	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (B2.1.36)	VI.A-1	3.6.1.13	A
Connector	EC	Various Metals Used for Electrical Contacts	Borated Water Leakage (Ext)	Corrosion of connector contact surfaces	Boric Acid Corrosion (B2.1.4)	VI.A-5	3.6.1.05	A
High Voltage Insulator	SS	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	None	None	VI.A-9	3.6.1.11	I, 1
High Voltage Insulator	SS	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	None	None	VI.A-10	3.6.1.11	I, 1

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
High Voltage Insulator	ES	Cement (Electrical Insulators)	Atmosphere/ Weather (Ext)	None	None	VI.A-9	3.6.1.11	I, 1
High Voltage Insulator	ES	Cement (Electrical Insulators)	Atmosphere/ Weather (Ext)	None	None	VI.A-10	3.6.1.11	I, 1
High Voltage Insulator	IN	Porcelain	Atmosphere/ Weather (Ext)	None	None	VI.A-9	3.6.1.11	I, 1
High Voltage Insulator	IN	Porcelain	Atmosphere/ Weather (Ext)	None	None	VI.A-10	3.6.1.11	I, 1
Insulated Cable and Connections	EC, IN	Various Organic Polymers	Adverse Localized Environment (Ext)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.24)	VI.A-2	3.6.1.02	A
Insulated Cable and Connections	EC, IN	Various Organic Polymers	Adverse Localized Environment (Ext)	Localized damage and breakdown of insulation leading to electrical failure	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements (B2.1.25)	VI.A-4	3.6.1.04	A

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Enclosed Bus (Bus and Connections)	EC	Various Metals Used for Electrical Contacts	Atmosphere/ Weather (Ext)	Loosening of bolted connections	Metal Enclosed Bus (B2.1.26)	VI.A-11	3.6.1.07	A
Metal Enclosed Bus (Bus & Connections)	EC	Various Metals Used for Electrical Contacts	Plant Indoor Air (Ext)	Loosening of bolted connections	Metal Enclosed Bus (B2.1.26)	VI.A-11	3.6.1.07	A
Metal Enclosed Bus (Enclosure)	SS	Carbon Steel	Plant Indoor Air (Ext)	Loss of material	Metal Enclosed Bus (B2.1.26)	VI.A-13	3.6.1.09	E, 3
Metal Enclosed Bus (Enclosure)	SS	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	Loss of material	Metal Enclosed Bus (B2.1.26)	VI.A-13	3.6.1.09	E, 3
Metal Enclosed Bus (Enclosure)	ES	Elastomer	Atmosphere/ Weather (Ext)	Hardening and loss of strength	Metal Enclosed Bus (B2.1.26)	VI.A-12	3.6.1.10	E, 3
Metal Enclosed Bus (Enclosure)	ES	Elastomer	Plant Indoor Air (Ext)	Hardening and loss of strength	Metal Enclosed Bus (B2.1.26)	VI.A-12	3.6.1.10	E, 3
Metal Enclosed Bus (Enclosure)	SS	Aluminum	Plant Indoor Air (Ext)	Loss of material	Metal Enclosed Bus (B2.1.26)	None	None	F
Metal Enclosed Bus (Enclosure)	SS	Aluminum	Atmosphere/ Weather (Ext)	Loss of material	Metal Enclosed Bus (B2.1.26)	None	None	F

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Enclosed Bus (Insulation & Insulators)	IN	Porcelain	Atmosphere/ Weather (Ext)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus (B2.1.26)	VI.A-14	3.6.1.08	A
Metal Enclosed Bus (Insulation & Insulators)	IN	Porcelain	Plant Indoor Air (Ext)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus (B2.1.26)	VI.A-14	3.6.1.08	A

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Metal Enclosed Bus (Insulation & Insulators)	IN	Various Insulation Material (Electrical)	Atmosphere/ Weather (Ext)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus (B2.1.26)	VI.A-14	3.6.1.08	A
Metal Enclosed Bus (Insulation & Insulators)	IN	Various Insulation Material (Electrical)	Plant Indoor Air (Ext)	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure	Metal Enclosed Bus (B2.1.26)	VI.A-14	3.6.1.08	A
Switchyard Bus and Connections	EC	Aluminum	Atmosphere/ Weather (Ext)	None	None	VI.A-15	3.6.1.12	I, 2
Switchyard Bus and Connections	EC	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	None	None	VI.A-15	3.6.1.12	I, 2

Table 3.6.2-1 Electrical and Instrument and Controls – Summary of Aging Management Evaluation – Electrical Components (Continued)

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Transmission Conductors and Connections	EC	Aluminum	Atmosphere/ Weather (Ext)	None	None	VI.A-16	3.6.1.12	I, 2
Transmission Conductors and Connections	EC	Carbon Steel (Galvanized)	Atmosphere/ Weather (Ext)	None	None	VI.A-16	3.6.1.12	I, 2

Notes for Table 3.6.2-1:

Standard Notes:

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

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

F Material not in NUREG-1801 for this component.

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

Plant Specific Notes:

1 See further evaluation in Section 3.6.2.2.2.

2 See further evaluation in Section 3.6.2.2.3.

3 The Metal Enclosed Bus program (B2.1.26) is used to manage the aging effects for all metal enclosed bus components.

CHAPTER 4

TIME-LIMITED AGING ANALYSES

4.0 TIME-LIMITED AGING ANALYSES

4.1 INTRODUCTION

This chapter describes the Time-Limited Aging Analyses (TLAAs) for South Texas Project (STP), Units 1 and 2, in accordance with 10 CFR 54.3(a) and 54.21(c). Subsequent sections of this chapter describe TLAAs within these common general categories:

1. Neutron embrittlement of the reactor vessel (Section 4.2)
2. Metal fatigue of vessels, piping, and components (Section 4.3)
3. Environmental Qualification (EQ) of electric equipment (Section 4.4)
4. Loss of prestress in concrete containment tendons (Section 4.5)
5. Fatigue of the containment liner and penetrations (Section 4.6)
6. Other plant-specific TLAAs (Section 4.7)

The information on each specific TLAA within these general categories is organized under three subheadings:

Summary Description

A brief description of the TLAA topic and of the affected components.

Analysis

A description of the current licensing basis analysis, that is, of the TLAA itself, including implications for the period of extended operation.

Disposition

The disposition of the TLAA for the period of extended operation, in accordance with 10 CFR 54.21(c)(1):

- Validation, 10 CFR 54.21(c)(1)(i): The analysis remains valid for the period of extended operation;
- Projection, 10 CFR 54.21(c)(1)(ii): The analysis has been projected to the end of the period of extended operation; or
- Aging Management, 10 CFR 54.21(c)(1)(iii): The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

4.1.1 Identification of TLAAs

Survey of Design and Licensing Bases

An analysis, calculation, or evaluation is a “Time Limited Aging Analysis” (TLAA) under the 10 CFR 54 License Renewal Rule only if it meets all six of the 10 CFR 54.3(a) criteria:

(1) Involve systems, structures, and components within the scope of license renewal, as delineated in § 54.4(a);

(2) Consider the effects of aging;

(3) Involve time-limited assumptions defined by the current operating term, for example, 40 years;

(4) Were determined to be relevant by the licensee in making a safety determination;

(5) Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions, as delineated in § 54.4(b); and

(6) Are contained or incorporated by reference in the current licensing basis (CLB).

10 CFR 54.21(c) requires that:

(1) A list of time-limited aging analyses, as defined in § 54.3, must be provided. The applicant shall demonstrate that –

(i) The analyses remain valid for the period of extended operation;

(ii) The analyses have been projected to the end of the period of extended operation; or

(iii) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

(2) A list must be provided of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in § 54.3. The applicant shall provide an evaluation that justifies the continuation of these exemptions for the period of extended operation.

This chapter provides these lists and dispositions, and their bases.

A list of potential TLAAs was assembled from regulatory guidance and industry experience, including:

- NUREG-1800, *Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants*, Chapter 4
- NEI 95-10, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – the License Renewal Rule*
- 10 CFR 54, *Requirements for Renewal of Operating Licenses for Nuclear Power Plants*
- Prior license renewal applications
- Plant-specific document reviews and interviews with plant personnel

Keyword searches were performed on the STP Units 1 and 2 CLB to determine whether each of these potential TLAAs exists in South Texas Project licensing basis The keyword search was also used to identify additional potential plant specific TLAAs. The CLB search included:

- The Updated Final Safety Analysis Report (UFSAR)
- Technical Specifications
- The NRC Safety Evaluation Reports (SERs) for the original operating licenses
- Subsequent NRC Safety Evaluations (SEs)
- STPNOC and NRC docketed licensing correspondence

The list of potential TLAAs was then reviewed with respect to the six 10 CFR 54.3(a) criteria; based on information in the CLB source documents and from source documents for the potential TLAAs such as:

- Vendor, NRC sponsored, and licensee topical reports
- Design calculations
- Code stress reports or code design reports
- Drawings
- Specifications

These TLAA source documents provided the information and the basis for the dispositions in this chapter.

Licensing basis program documents, such as the in-service inspection and environmental qualification of electrical components programs (ISI and EQ programs), were reviewed separately.

The scope of the Environmental Qualification program is generally limited to safety-related components, whose environmental qualifications for the design lifetime are TLAAs. A detailed screening of each component would require examination of the individual component qualifications; and is not required for the license renewal application (LRA).

Disposition of indications discovered during in-service inspections may include qualifications for the licensed design life that are TLAAs. These are typically identified during the review of licensing correspondence.

4.1.2 Aging Management Review

The NUREG-1801, *Generic Aging Lessons Learned (GALL) Report*, identifies numerous aging effects that require evaluation as possible TLAAs in accordance with 10 CFR 54.21(c). Each of these was reviewed in this chapter, and dispositioned as a TLAA if identified as such under the 10 CFR 54.3(a) criteria.

4.1.3 Plant Classification System

The STP classification system is common to US light water reactor plants with construction permits after about 1974. In brief:

- Fluid systems and components are classified as ANSI N18.2 Safety Class 1, 2, 3, and NNS (not nuclear safety-related); and to the approximately-corresponding Regulatory Guide 1.26 Quality Group Classifications A, B, C and D. The first three of these classes are designed to ASME Boiler and Pressure Vessel Code, Section III, Nuclear Components, for the corresponding ASME Safety Classes 1, 2, and 3. Quality Group D corresponds to Safety Class NNS that are commonly designed to ASME Section VIII, ANSI B31.1, and appropriate manufacturer's standards. See UFSAR Section 3.2, *Classification of Structures, Components, and Systems,* for details.

- For seismic design, all Safety Class 1, 2, and 3 structures, systems, and components (SSCs) are generally classified as Seismic Category I and must remain functional following a safe shutdown earthquake (SSE). Non-Seismic Category I SSCs must retain sufficient integrity to prevent unanalyzed releases (radwaste systems, etc.), and must not cause unacceptable damage to safety class SSCs in the event of an SSE. See UFSAR Section 3.2.A.1.

- Electrical systems and components are divided between safety-related Class 1E and others "non-Class 1E." See UFSAR Chapter 8.

Other SSCs not required to meet criteria of these design and safety classes are designed to applicable building and industrial codes, and to good practice.

4.1.4 Identification of Exemptions

10 CFR 54.21(c)(2) requires a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in

10 CFR 54.3. The applicant shall provide an evaluation that justifies the continuation of these exemptions for the period of extended operation.

Docketed correspondence, the operating license, and the UFSAR were searched to identify exemptions in effect. Each exemption in effect was then evaluated to determine whether it involved a TLAA as defined in 10 CFR 54.3.

Seven 10 CFR 50.12 exemptions “currently in effect” for STP were identified. Of those, only one exemption, the use of the Leak-Before-Break (LBB) evaluation of reactor coolant system piping for STP Units 1 and 2, is based in part on a time-limited aging analysis. The LBB analysis is described in Section 4.3.2.11, *Fatigue Crack Growth Assessments and Fracture Mechanics Stability Analyses for Leak-Before-Break (LBB) Elimination of Dynamic Effects of Primary Loop Piping Failures*.

4.1.5 Summary of Results

Sections 4.2 through 4.7 of this chapter list and describe six general categories of TLAAs. They are listed in Table 4.1-1. They are presented in the order in which they appear in Sections 4.2 through 4.7 of the NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants (the SRP)*.

Standard Review Plan Tables 4.1-2 and 4.1-3 list examples of analyses that could be TLAAs, depending on the applicant's current licensing basis (CLB). Table 4.1-2 summarizes the results of the STP review of the analyses identified in SRP Tables 4.1-2 and 4.1-3.

Table 4.1-1 List of TLAAs

TLAA Category	Description	Disposition Category(1)	Report Section
1.	**Reactor Vessel Neutron Embrittlement Analysis**	**N/A**	**4.2**
	Neutron Fluence Values	iii	4.2.1
	Pressurized Thermal Shock	ii	4.2.2
	Upper-Shelf Energy (USE)	ii	4.2.3
	Pressure-Temperature (P-T) Limits	iii	4.2.4
	Low Temperature Overpressure Protection	iii	4.2.5
2	**Metal Fatigue Analysis**	**N/A**	**4.3**
	Fatigue Management Program	N/A	4.3.1

Table 4.1-1 List of TLAAs

TLAA Category	Description	Disposition Category(1)	Report Section
	ASME III Class I Fatigue Analysis of Vessels, Piping and Components	N/A	4.3.2
	Reactor Pressure Vessel, Nozzles, Head, and Studs	i, iii	4.3.2.1
	Control Rod Drive Mechanism (CRDM) Pressure Housings and Core Exit Thermocouple Nozzle Assemblies (CETNAs)	i	4.3.2.2
	Reactor Coolant Pump Pressure Boundary Components	i, ii, iii	4.3.2.3
	Pressurizer and Pressurizer Nozzles	ii, iii	4.3.2.4
	Steam Generator ASME III Class 1, Class 2 Secondary Side, and Feedwater Nozzle Fatigue Analyses	iii	4.3.2.5
	ASME III Class 1 Valves	ii, iii	4.3.2.6
	ASME III Class 1 Piping and Piping Nozzles	iii	4.3.2.7
	Response to NRC Bulletin 88-08: Intermittent Thermal Cycles due to Thermal-Cycle-Driven Interface Valve Leaks and Similar Cyclic Phenomena	ii	4.3.2.8
	Response to NRC Bulletin 88-11: Revised Fatigue Analysis of the Pressurizer Surge Line for Thermal Cycling and Stratification	iii	4.3.2.9
	High Energy Line Break Postulation Based on Fatigue Cumulative Usage Factor	ii, iii	4.3.2.10
	Fatigue Crack Growth Assessments and Fracture Mechanics Stability Analyses for Leak-Before-Break (LBB) Elimination of Dynamic Effects of Primary Loop Piping Failures	iii	4.3.2.11
	Class 1 Design of Class 3 Feedwater Control Valves	i	4.3.2.12
	ASME Section III Subsection NG Fatigue Analysis of Reactor Pressure Vessel Internals	iii	4.3.3
	Effects of the Reactor Coolant System Environment on Fatigue Life of Piping and Components (Generic Safety Issue 190)	iii	4.3.4
	Assumed Thermal Cycle Count for Allowable Secondary Stress Range Reduction Factor in ANSI B31.1 and ASME Section III Class 2 and 3 Piping	i	4.3.5
	ASME Section III Fatigue Analysis of Metal Bellows and Expansion Joints	i, iii	4.3.6
3.	**Environmental Qualification (EQ) of Electric Equipment**	**iii**	**4.4**
4.	**Concrete Containment Tendon Prestress Analysis**	**iii**	**4.5**

Table 4.1-1 List of TLAAs

TLAA Category	Description	Disposition Category[1]	Report Section
5.	**Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis**	**N/A**	**4.6**
	Fatigue Waivers for the Personnel Airlocks and Emergency Airlocks	ii	4.6.1
	Fatigue Design of Containment Penetrations	i, iii	4.6.2
6.	**Other Plant-Specific Time-Limited Aging Analyses**	**N/A**	**4.7**
	Load Cycle Limits of Cranes, Lifts, and Fuel Handling Equipment Designed to CMAA-70	i	4.7.1
	In-service Flaw Growth Analyses that Demonstrate Structural Stability for 40 years	N/A	4.7.2
	TLAA for the Corrosion Effects in the Essential Cooling Water (ECW) System	iii	4.7.3
	Absence of a TLAA for Reactor Vessel Underclad Cracking Analyses	N/A	4.7.4
	Reactor Coolant Pump Flywheel Fatigue Crack Growth Analysis	i	4.7.5

1 (i) 10 CFR 54.21(c)(1)(i), Validation: The analyses remain valid for the period of extended operation.
(ii) 10 CFR 54.21(c)(1)(ii), Projection: The analyses have been projected to the end of the period of extended operation.
(iii) 10 CFR 54.21(c)(1)(iii), Aging Management: The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.
N/A Not Applicable: Section heading or no TLAA. Disposition categories are not applicable.

Table 4.1-2 Review of Analyses Listed in NUREG-1800, Tables 4.1-2 and 4.1-3

NUREG-1800 Examples	Applicability to STP	Section
NUREG-1800, Table 4.1-2 – Potential TLAAs		
Reactor vessel neutron embrittlement	Yes	4.2
Concrete containment tendon prestress	Yes	4.5
Metal fatigue	Yes	4.3
Environmental qualification of electric equipment	Yes	4.4
Metal corrosion allowance	Yes	4.7.3
In-service flaw growth analyses that demonstrate structure stability for 40 years	Yes	4.3.2.1, 4.3.2.4, 4.7.2
In-service local metal containment corrosion analyses	No – No explicit basis based on plant life applies.	-
High-energy line-break postulation based on fatigue cumulative usage factor	Yes	4.3.2.10
NUREG-1800, Table 4.1-3 – Additional Examples of Plant-Specific TLAAs		
Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding	No – No HAZ analyses were identified within the CLB.	4.7.4
Low-temperature overpressure (LTOP) analyses	Yes	4.2.5
Fatigue analysis for the main steam supply lines to the turbine-driven auxiliary feedwater pumps	No-No explicit basis based on plant life applies.	4.3.5
Fatigue analysis for the reactor coolant pump flywheel	Yes.	4.7.5
Fatigue analysis of polar crane	Yes	4.7.1
Flow-induced vibration endurance limit	No - Protection from flow induced vibration is ensured via testing and stress endurance limit criteria at STP and does not include a TLAA.	4.3.3
Transient cycle count assumptions	Yes	4.3.3

Table 4.1-2 Review of Analyses Listed in NUREG-1800, Tables 4.1-2 and 4.1-3

NUREG-1800 Examples	Applicability to STP	Section
Ductility reduction of fracture toughness for the reactor vessel internals	No – STP is designed with no explicit embrittlement analysis based on the plant life for internals.	-
Leak before break	Yes	4.3.2.10, 4.3.2.11
Fatigue analysis for the containment liner plate	No – No fatigue or cycle based analysis supports design of the liner.	4.6
Containment penetration pressurization cycles	Yes	4.6.2
Reactor vessel circumferential weld inspection relief (BWR)	No – STP is a PWR.	-

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT ANALYSIS

Reactor pressure vessel (RPV) materials are subject to embrittlement, primarily due to exposure to neutron radiation. STP UFSAR Section 5.3.1 contains extensive data on vessel material composition, properties, and the vessel coupon surveillance program which are meant to provide reasonable assurance that reactor vessel integrity is maintained.

Neutron embrittlement is the term used to describe changes in mechanical properties of reactor vessel materials that result from exposure to fast neutron flux of greater than 1×10^{17} n/cm^2 (E>1.0 MeV) within the vicinity of the reactor core, called the beltline region. The beltline region of a reactor vessel is defined in 10 CFR 50.61(a)(3) as: the region of the reactor vessel (shell material including welds, heat-affected zones and plates and forgings) that directly surrounds the effective height of the active core and adjacent regions of the reactor vessel that are predicted to experience sufficient neutron radiation damage to be considered in the selection of the most limiting material with regard to radiation damage.

The most pronounced material change is a reduction in fracture toughness. As fracture toughness decreases with cumulative fast neutron exposure, the material's resistance to crack propagation decreases. The rate of neutron exposure is defined as neutron flux, and the cumulative degree of exposure over time is defined as neutron fluence. Fracture toughness of ferritic materials is not only dependent upon fluence, but is also dependent upon temperature. The reference temperature for nil-ductility transition (RT_{NDT}) is an indicator of the transition temperature range above which the material behaves in a ductile manner, and below which it behaves in a brittle manner. As fluence increases, the nil-ductility reference temperature increases. This means higher temperatures are required for the material to continue to act in a ductile manner. This shift in reference temperature is the ΔRT_{NDT}. The adjusted reference temperature (ART) is the initial RT_{NDT} plus ΔRT_{NDT} plus a margin term added to account for uncertainties associated with the limited amount of data available for making the projections, and is used to determine operating pressure-temperature limits.

In accordance with 10 CFR 50, Appendix H, any materials exceeding 1×10^{17} n/cm^2 (E>1.0 MeV) must be monitored to evaluate the changes in fracture toughness. Reactor vessel materials not previously identified as beltline material because of low levels of neutron radiation (extended beltline material) must therefore be evaluated to determine whether they will exceed the 1×10^{17} n/cm^2 fluence threshold at end-of-license extended (EOLE), and must therefore be evaluated for the effects of neutron embrittlement. Projected 60 year operation values are 52.40 EFPY for Unit 1 and 53.29 EFPY for Unit 2. Therefore, the EOLE basis of 54 effective full power years (EFPY) based on a lifetime capacity factor of 90 percent for 60 years will bound the current operation expected for STP.

The projected reduction in fracture toughness is a function of fluence and affects several analyses used to support operation of the STP reactor vessels:

- Neutron Fluence Values (Section 4.2.1)
- Pressurized Thermal Shock (Section 4.2.2)
- Upper-Shelf Energy, C_V USE (Section 4.2.3)
- Pressure-Temperature (P-T) Limits (Section 4.2.4)
- Low Temperature Overpressure Protection, LTOP (Section 4.2.5)

The limits and effects in these sections are part of the licensing basis, and support the safety determinations and Technical Specification operating limits. The analyses for reduction of fracture toughness and the EOLE neutron fluence depend on the life of the plant, and their calculations are TLAAs and must be dispositioned for the period of extended operation.

4.2.1 Neutron Fluence Values

Summary Description

Loss of fracture toughness is an aging effect caused by the neutron embrittlement aging mechanism that results from prolonged exposure to neutron radiation. This process results in increased tensile strength and hardness of the material with reduced toughness. As neutron embrittlement progresses, the toughness/temperature curve shifts down (lower fracture toughness as indicated by Charpy upper shelf energy or C_V USE), and the curve shifts to the right (brittle/ductile transition temperature increases). Neutron fluence projections are made in order to estimate the effect on these reactor vessel material properties (Section 4.2.2, Pressurized Thermal Shock, and Section 4.2.3, Upper-Shelf Energy (USE)).

Analysis

The critical time-dependent parameter for determining radiation embrittlement effects is lifetime fluence of neutrons with energies greater than 1 MeV.

Increased plant capacity factors prompted the increase in the lifetime capacity factor assumed for fluence estimates from 80 to 90 percent, and increased the assumed EOL EFPY for the period of extended operation to 54 EFPY.

Unit 1

The last capsule withdrawn from Unit 1 was Capsule V at the end-of-cycle (EOC) 11 after 11.13 EFPY of operation, which yielded a vessel equivalent exposure of greater than 33.84 EFPY. This exposure is less than that expected at the EOLE.

Unit 2

The last capsule withdrawn from Unit 2 was Capsule U at EOC 9 after 10.31 EFPY of operation, which yielded a vessel equivalent exposure of 32.99 EFPY. This exposure is less than that expected at the EOLE.

Both Units

The fluence values for EOLE were projected based on the results of the Capsule V and U analyses for Units 1 and 2, respectively. The revised fluences were determined with transport calculations using the DORT discrete ordinates code and the BUGLE-96 cross-section library which is derived from ENDF/B-VI. The neutron transport and dosimetry evaluation methodologies follow the guidance and meet the requirements of the most recent issue of Regulatory Guide 1.190, *Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence*.

The fluence projections were developed with dosimeter data for which all measurement-to-calculation comparisons fall well within the 20 percent limits specified as the acceptance criteria in Regulatory Guide 1.190.

The STP vessel beltline peak neutron fluences are listed in Table 4.2-1 along with historical and current licensing basis fluences. The EOLE fluence projections include operation to 54 EFPY, the use of lower-leakage cores, and the uprate.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

Fluence is managed for the period of extended operation by the Reactor Vessel Surveillance program described in B2.1.15. The validity of these parameters and the analyses that depend upon them will be managed to the end of the period of extended operation. Therefore this TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Table 4.2-1 STP Reactor Vessel Peak Beltline Neutron Fluences

Case	EFPY	Fluence >1 MeV, x 10^{19} n/cm^2
40-year projection at the clad-base metal interface referenced in the current analysis of the P-T limit curves.	32	3.96
Clad-base metal fluences used for PTS responses to the NRC.	32	U1 = 3.00 U2 = 2.71
Exposure of neutron dosimetry at withdrawal of Capsules V and U.	U1 = 11.13 U2 = 10.31	U1 = 2.62 U2 = 2.40
Capsules dosimeter 40-year calculated projection at the clad-base metal interface.	34	U1 = 2.46 U2 = 2.36
Capsule dosimeter 60-year peak projection at the clad-base metal interface.	54	U1 = 3.86 U2 = 3.73

Table 4.2-1 STP Reactor Vessel Peak Beltline Neutron Fluences

Case	EFPY	Fluence >1 MeV, x 10^{19} n/cm^2
60-year calculated projection at ¼T through the vessel wall (RG 1.99 Revision 2 Section 1.1 Equation 3 attenuation).	54	U1 = 2.29 U2 = 2.21
60-year calculated projection at ¾T through the vessel wall (RG 1.99 Revision 2 Section 1.1 Equation 3 attenuation).	54	U1 = 0.81 U2 = 0.78

4.2.2 Pressurized Thermal Shock

Summary Description

10 CFR 50.61(b)(1) provides rules for protection against pressurized thermal shock (PTS) events for pressurized water reactors. Licensees are required to perform an updated assessment of the projected values of PTS reference temperature (RT_{PTS}) whenever there is a significant change in projected values of RT_{PTS}, or upon a request for a change in the expiration date for operation of the facility.

The license renewal rule 10 CFR 54.4(a)(3) also requires that the licensee evaluate those structures, systems, and components (SSCs) relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for PTS.

10 CFR 50.61(c) provides two methods for determining RT_{PTS}. These methods are also described as Positions 1 and 2 in Regulatory Guide 1.99, *Radiation Embrittlement of Reactor Vessel Materials*. Position 1 applies for material that *does not* have credible surveillance data available and Position 2 is used for material that *does* have two or more credible surveillance data sets available. The adjusted reference temperatures are calculated for both Positions 1 and 2 by following the guidance in Regulatory Guide 1.99 (Sections 1.1 and 2.1, respectively), using the copper and nickel content of STP beltline materials, and the EOLE fluence projections.

10 CFR 50.61(b)(2) establishes screening criteria for RT_{PTS} as 270°F for plates, forgings, and axial welds and 300°F for circumferential welds. If the RT_{PTS} does not exceed the PTS screening criteria, then only the reactor pressure vessel is relied on to demonstrate compliance with the 10 CFR 50.61, the PTS rule.

Analysis

The original response to the issuance of the PTS rule, 10 CFR 50.61, by STP indicated that the projected RT_{PTS} for both units do not exceed the PTS screening criteria (270°F for plates, forgings, and axial welds; and 300°F for circumferential welds), based on a 40 year, 32 EFPY life.

The most recent coupon examination results for both units show that the shift in RT_{NDT} in plate and weld materials are in good agreement with or less than the Regulatory Guide 1.99 Revision 2 predictions for Units 1 and 2. The results demonstrate that the Regulatory Guide 1.99 predictions provide a conservative means to satisfy the requirement of 10 CFR 50.61; thus providing assurance of the reactor vessel integrity.

Unit 1

The data from the most recently withdrawn surveillance capsule, Capsule V, were deemed credible. RT_{PTS} values were generated for beltline and extended beltline region materials of the Unit 1 reactor vessel for fluence values at EOLE (54 EFPY). The Unit 1 RT_{NDT} results from Capsule V indicated measured mean 30 ft-lb transition temperatures of -12.17°F, 17.78°F, and -29.41°F for longitudinal plate coupons, transverse plate coupons, and the weld metal respectively. The Capsule V material is from intermediate shell R1606-2.

The RT_{PTS} values for the Unit 1 beltline materials are provided in Table 4.2-2. The limiting material for Unit 1 is the intermediate shell R1606-3 with a projected EOLE RT_{PTS} value of 83.6°F. The projected RT_{PTS} values for EOLE meet the 10 CFR 50.61 screening criteria.

The extended beltline materials that are expected to receive fluence values greater than 1×10^{17} n/cm^2 (E>1.0 MeV) were also evaluated. The RT_{PTS} values were shown to meet the 10 CFR 50.61 screening criteria.

Unit 2

The data from the most recently withdrawn surveillance capsule, Capsule U, was deemed credible. RT_{PTS} values were generated for beltline and extended beltline region materials of the Unit 2 reactor vessel for fluence values at EOLE (54 EFPY). The Unit 2 RT_{NDT} results from Capsule U indicated measured mean 30 ft-lb transition temperatures of -10.49°F, 22.23°F, and 5.88°F for longitudinal plate coupons, transverse plate coupons, and the weld metal respectively. The Capsule U material is from intermediate shell R2507-1.

The RT_{PTS} values for the Unit 2 beltline materials are provided in Table 4.2-3. The limiting material for Unit 2 is the intermediate shell R2507-2 with a projected EOLE RT_{PTS} value of 63.7°F. The projected RT_{PTS} values for EOLE meet the 10 CFR 50.61 screening criteria.

The extended beltline materials that are expected to receive fluence values greater than 1×10^{17} n/cm^2 (E>1.0 MeV) were also evaluated. The RT_{PTS} values were shown to meet the 10 CFR 50.61 screening criteria.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii)

The RT_{PTS} values were revised with projections to the end of the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

Table 4.2-2 STP Unit 1 Vessel Limiting 54 EFPY RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	Heat Number.	Base Metal / Flux Type	Cu (%)	Ni (%)	CF	Fluence (10^{19} n/cm^2)	FF	σ_I	σ_Δ	Margin	Initial RT_{NDT}	ΔRT_{NDT}	EOL RT_{NDT} (w/out margin)	RT_{PTS}	
Base Metals															
Inlet Nozzle R1613-1	-	SA508 CL. 2	0.35	0.8	241	0.0345	0.24	17	17	48.1	-10	57	47.4	95.5	Y
Inlet Nozzle R1613-2	-	SA508 CL. 2	0.35	0.82	244.1	0.0345	0.24	17	17	48.1	0	58	58.1	106.2	Y
Inlet Nozzle R1613-3	-	SA508 CL. 2	0.09	0.79	58	0.0345	0.24	0	6.9	13.8	-20	14	-6.2	7.6	Y
Inlet Nozzle R1613-4	-	SA508 CL. 2	0.35	0.85	248.8	0.0345	0.24	17	17	48.1	20	59	79.2	127.3	Y
Outlet Nozzle R1614-1	-	SA508 CL. 2	0.35	0.66	220.7	0.0345	0.24	17	17	48.1	10	53	62.6	110.6	Y
Outlet Nozzle R1614-2	-	SA508 CL. 2	0.35	0.71	228.0	0.0345	0.24	17	17	48.1	0	54	54.3	102.4	Y
Outlet Nozzle R1614-3	-	SA508 CL. 2	0.35	0.69	225.1	0.0345	0.24	17	17	48.1	-30	54	23.6	71.7	Y
Outlet Nozzle R1614-4	-	SA508 CL. 2	0.35	0.9	256.5	0.0345	0.24	17	17	48.1	10	61	71.1	119.2	Y
Nozzle Shell R1607-1	-	SA533B CL. 1	0.08	0.62	51	0.0345	0.24	0	6.1	12.1	50	12	62.1	74.3	Y
Nozzle Shell R1607-2	-	SA533B CL. 1	0.08	0.66	51	0.0345	0.24	0	6.1	12.1	50	12	62.1	74.3	Y
Nozzle Shell R1607-3	-	SA533B CL. 1	0.07	0.6	44	0.0345	0.24	0	5.2	10.5	30	10	40.5	51.0	Y

Table 4.2-2 STP Unit 1 Vessel Limiting 54 EFPY RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	Heat Number.	Base Metal / Flux Type	Cu (%)	Ni (%)	CF	Fluence (10^{19} n/cm^2)	FF	σ_I	σ_Δ	Margin	Initial RT_{NDT}	ΔRT_{NDT}	EOL RT_{NDT} (w/out margin)	RT_{PTS}	
Inter. Shell R1606-1	B-8120-2	SA533B CL. 1	0.04	0.63	26	2.85	1.28	0	16.6	33.2	10	33	43.2	76.5	N
Inter. Shell R1606-2	B-8120-1	SA533B CL. 1	0.04	0.61	26	2.85	1.28	0	16.6	33.2	0	33	33.2	66.5	N
	S/C		-	-	26.6	2.85	1.28	0	8.5	17.0	0	34	34.0	51.0	
Inter. Shell R1606-3	C-4326-2	SA533B CL. 1	0.05	0.62	31	2.85	1.28	0	17.0	34.0	10	40	49.6	83.6	N
Lower Shell R1622-1	B-9566-2	SA533B CL. 1	0.05	0.61	31	3.86	1.35	0	17.0	34.0	-30	42	11.8	45.8	N
Lower Shell R1622-2	B-9575-2	SA533B CL. 1	0.07	0.64	44	3.86	1.35	0	17.0	34.0	-30	59	29.3	63.3	N
Lower Shell R1622-3	B-9575-1	SA533B CL. 1	0.05	0.66	31	3.86	1.35	0	17.0	34.0	-30	42	11.8	45.8	N
Bottom Head Torus R1617-1	-	SA533B CL. 1	0.14	0.67	101.8	0.0341	0.24	0	12.0	24.1	-30	24	-5.9	18.1	Y
Bottom Head Dome R1618-1	-	SA533B CL. 1	0.08	0.67	51	0.0341	0.24	0	6.0	12.1	-30	12	-17.9	-5.9	Y
Welds															
Upper to Inter. circ. Weld	-	-	0.1	1	135	0.0345	0.24	17	16.1	46.8	-56	32	-23.9	22.9	Y

Table 4.2-2 STP Unit 1 Vessel Limiting 54 EFPY RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	**Heat Number.**	**Base Metal / Flux Type**	**Cu (%)**	**Ni (%)**	**CF**	**Fluence (10^{19} n/cm^2)**	**FF**	**σ_I**	**σ_Δ**	**Margin**	**Initial RT_{NDT}**	**ΔRT_{NDT}**	**EOL RT_{NDT} (w/out margin)**	**RT_{PTS}**	
Inter. Shell long. weld G1.70	89476	Linde 0091	0.02	0.07	27	1.53	1.12	0	15.1	30.2	-50	30	-19.8	10.4	N
	S/C Data	-	-	-	30.4	1.53	1.12	0	8.5	17.0	-50	34	-16.0	1.0	
Lower shell long. Weld G1.70	89476	Linde 0091	0.02	0.07	27	3.86	1.35	0	18.2	36.4	-50	36	-13.6	22.8	N
	S/C	-	-	-	30.4	3.86	1.35	0	10.2	20.5	-50	41	-9.0	11.5	
Inter. to lower circ. weld E3.13	89476	Linde 124	0.02	0.07	27	2.84	1.28	0	17.2	34.5	-70	34	-35.5	-1.0	N
	S/C	-	-	-	30.4	2.84	1.28	0	9.7	19.4	-70	39	-31.2	-11.7	
Lower shell to lower head circ. weld	-	-	0.1	1	135	0.0341	0.24	17	16.0	46.6	-56	32	-24.1	22.6	Y

Table 4.2-3 STP Unit 2 Vessel Limiting RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	**Heat Number.**	**Base Metal / Flux Type**	**Cu (%)**	**Ni (%)**	**CF**	**Fluence (10^{19} n/cm^2)**	**FF**	**σ_I**	**σ_Δ**	**Margin**	**Initial RT_{NDT}**	**ΔRT_{NDT}**	**EOL RT_{NDT} (w/out margin)**	**RT_{PTS}**	
Base Metals															
Inlet Nozzle R2011-1	-	SA508 CL. 2	0.1	0.81	67	0.0328	0.23	0	7.7	15.5	-40	15	-24.5	-9.0	Y
Inlet Nozzle R2011-2	-	SA508 CL. 2	0.1	0.84	67	0.0328	0.23	0	7.7	15.5	-20	15	-4.5	11.0	Y
Inlet Nozzle R2011-3	-	SA508 CL. 2	0.12	0.84	86	0.0328	0.23	0	9.9	19.9	-20	20	-0.1	19.8	Y
Inlet Nozzle R2011-4	-	SA508 CL. 2	0.11	0.83	77	0.0328	0.23	0	8.9	17.8	-20	18	-2.2	15.6	Y
Outlet Nozzle R2012-1	-	SA508 CL. 2	0.35	0.72	229.4	0.0328	0.23	17	17.0	48.1	10	53	63.1	111.1	Y
Outlet Nozzle R2012-2	-	SA508 CL. 2	0.35	0.68	223.6	0.0328	0.23	17	17.0	48.1	10	52	61.7	109.8	Y
Outlet Nozzle R2012-3	-	SA508 CL. 2	0.35	0.67	222.2	0.0328	0.23	17	17.0	48.1	0	51	51.4	99.5	Y

Table 4.2-3 STP Unit 2 Vessel Limiting RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	Heat Number.	Base Metal / Flux Type	Cu (%)	Ni (%)	CF	Fluence (10^{19} n/cm^2)	FF	σ_I	σ_Δ	Margin	Initial RT_{NDT}	ΔRT_{NDT}	EOL RT_{NDT} (w/out margin)	RT_{PTS}	
Outlet Nozzle R2012-4	-	SA508 CL. 2	0.35	0.68	223.6	0.0328	0.23	17	17.0	48.1	10	52	61.7	109.8	Y
Nozzle Shell R2505-1	-	SA533B CL. 1	0.05	0.66	31	0.0328	0.23	0	3.6	7.2	0	7	7.2	14.3	Y
Nozzle Shell R2505-2	-	SA533B CL. 1	0.07	0.64	44	0.0328	0.23	0	5.1	10.2	0	10	10.2	20.4	Y
Nozzle Shell R2505-3	-	SA533B CL. 1	0.05	0.65	31	0.0328	0.23	0	3.6	7.2	-10	7	-2.8	4.3	Y
Inter. Shell R2507-1	NR 62 067-1	SA533B CL. 1	0.04	0.65	26	2.86	1.28	0	16.6	33.3	-10	33	23.3	56.5	N
	Using S/C Data	SA533B CL. 1	-	-	28.9	2.86	1.28	0	8.5	17.0	-10	37	27.0	44.0	
Inter. Shell R2507-2	NR 62 230-1	SA533B CL. 1	0.05	0.64	31	2.86	1.28	0	17	34.0	-10	40	29.7	63.7	N
Inter. Shell R2507-3	NR 62 248-1	SA533B CL. 1	0.05	0.61	31	2.86	1.28	0	17	34.0	-40	40	-0.3	33.7	N

Table 4.2-3 STP Unit 2 Vessel Limiting RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	Heat Number.	Base Metal / Flux Type	Cu (%)	Ni (%)	CF	Fluence (10^{19} n/cm^2)	FF	σ_I	σ_Δ	Margin	Initial RT_{NDT}	ΔRT_{NDT}	EOL RT_{NDT} (w/out margin)	RT_{PTS}	
Lower Shell R3022-1	NR 64 647-1	SA533B CL. 1	0.03	0.63	20	3.72	1.34	0	13.4	26.8	-30	27	-3.2	23.6	N
Lower Shell R3022-2	NR 64 627-1	SA533B CL. 1	0.04	0.61	26	3.72	1.34	0	17	34.0	-40	35	-5.2	28.8	N
Lower Shell R3022-3	NR 64 445-1	SA533B CL. 1	0.04	0.6	26	3.72	1.34	0	17	34.0	-40	35	-5.2	28.8	N
Bottom Head Torus R3020-1	-	SA533B CL. 1	0.11	0.65	74.5	0.0343	0.24	0	8.9	17.7	40	18	57.7	75.4	Y
Bottom Head Dome R3021-1	-	SA533B CL. 1	0.09	0.64	58	0.0343	0.24	0	6.9	13.8	-60	14	-46.2	-32.5	Y
Welds															
Upper to Inter. circ. weld seam	-	-	0.1	1	135	0.0328	0.23	17	15.6	46.2	-56	31	-24.8	21.4	Y

Table 4.2-3 STP Unit 2 Vessel Limiting RT_{PTS}

Material Description			Chemistry			Fluence		Margin			54 EFPY RT_{NDT}				Ext. Belt-line (Y/N)
Component	Heat Number.	Base Metal / Flux Type	Cu (%)	Ni (%)	CF	Fluence (10^{19} n/cm^2)	FF	σ_I	σ_Δ	Margin	Initial RT_{NDT}	ΔRT_{NDT}	EOL RT_{NDT} (w/out margin)	RT_{PTS}	
Inter. shell long. weld seams G3.02	90209	Linde 0091	0.04	0.11	54	1.68	1.14	0	28	56.0	-70	62	-8.3	47.7	N
	Using S/C Data	-	-	-	8.4	1.68	1.14	0	2.4	4.8	-70	10	-60.4	-55.6	
Lower shell long. weld seams E3.12	90209	Linde 124	0.04	0.11	54	3.72	1.34	0	28	56.0	-70	72	2.4	58.4	N
	Using S/C Data	-	-	-	8.4	3.72	1.34	0	2.8	5.6	-70	11	-58.7	-53.1	
Inter. to lower circ. weld seam E3.12	90209	Linde 124	0.04	0.11	54	2.84	1.28	0	28	56.0	-70	69	-1.0	55.0	N
	Using S/C Data	-	-	-	8.4	2.84	1.28	0	2.7	5.4	-70	11	-59.3	-53.9	
Lower shell to lower head circ. Weld	-	-	0.1	1	135	0.0343	0.24	17	16.0	46.7	-56	32	-24.0	22.8	Y

4.2.3 Upper-Shelf Energy (USE)

Summary Description

Per Regulatory Guide 1.99, *Radiation Embrittlement of Reactor Vessel Materials*, the Charpy upper-shelf energy (C_V USE) is assumed to decrease as a function of fluence and copper content. Figure 2 of the guide determines this magnitude of decrease when surveillance data is not used (Position 1.2). In addition, if surveillance data is to be used (Position 2.2), the decrease in upper shelf energy may be obtained by plotting the reduced plant surveillance data on Figure 2 of the guide and fitting the data with a line drawn parallel to the existing lines as the upper bound of all the data. This line can then be used in preference to the existing line. The C_V USE can be predicted using the corresponding ¼T fluence projection, the copper content of the beltline materials, and the results of the capsules tested to date using Figure 2 of the guide. The fluence at the ¼T depth (f) is determined using the clad / base metal fluence (fsurf) and the depth of the desired location in inches.

10 CFR 50, Appendix G, Section IV.A.1.a requires that the reactor vessel beltline materials must have a C_V USE of no less than 75 ft-lb initially, and must maintain C_V USE throughout the life of the vessel of no less than 50 ft-lb unless it is demonstrated in a manner approved by the Director, Office of Nuclear Reactor Regulation, that lower values of C_V USE will provide margins of safety against fracture equivalent to those required by ASME Section XI, *Rules for In-Service Inspection of Nuclear Power Plant Components, Appendix G*.

Analysis

The most recent coupon examination results for both units show that the decline in C_V USE in plate and weld materials are less than originally predicted by Regulatory Guide 1.99 Revision 2 for Units 1 and 2. The results demonstrate that the Regulatory Guide 1.99 predictions provide a conservative means to satisfy the requirements of 10 CFR 50, Appendix G; thus providing assurance of the reactor vessel integrity.

Unit 1

The C_V USE results from Unit 1 surveillance Capsule V indicated a mean Charpy V-notch C_V USE of 131 ft-lbf, 106 ft-lbf and 86 ft-lbf for longitudinal plate coupons, transverse plate coupons, and the weld metal respectively. The data were determined to be credible, however the data were not included in the EOLE C_V USE projections.

To support operation during the period of extended operation, these values were projected to 54 EFPY of operation. The EOLE C_V USE values for the Unit 1 beltline materials are provided in Table 4.2-4. The limiting value was 71 ft-lbf for intermediate shell R1606-2.

The extended beltline nozzle and shell materials that are expected to receive fluence values greater than 1 x 10^{17} n/cm^2 (E>1.0 MeV) were also evaluated and confirm an EOLE C_V USE that is greater than 50 ft-lbf. The weld material is addressed below.

Unit 2

The C_V USE results from Unit 2 surveillance Capsule U indicated a mean Charpy V-notch C_V USE of 138 ft-lbf, 98 ft-lbf, and 97 ft-lbf for longitudinal plate coupons, transverse plate coupons, and the weld metal respectively. The Surveillance Capsule U results for Unit 2 were deemed credible, however the data were not included in the EOLE C_V USE projections.

To support operation during the period of extended operation, these values were projected to 54 EFPY of operation. The EOLE C_V USE values for the Unit 2 beltline materials are provided in Table 4.2-5. The limiting value was 75 ft-lbf for lower shell longitudinal weld E3.12.

The extended beltline nozzle and shell materials that are expected to receive fluence values greater than 1 x 10^{17} n/cm^2 (E>1.0 MeV) were also evaluated. The bottom head torus, R3020-1, was identified to have a projected EOLE C_V USE value of 76 ft-lbf. The RT_{PTS} is more limiting than the beltline material. However the C_V USE still meets the 10 CFR 50, Appendix G 50 ft-lbf criterion. The weld material is addressed below.

Units 1 and 2 Extended Beltline Welds

The estimated limiting EOL C_V USE of Unit 1 and 2 extended beltline welds is 49 ft-lbf. However the assumptions used to evaluate these welds include several conservativisms: (1) The assumed unirradiated C_V USE is the lowest acceptable value; (2) The assumed Cu value is the maximum acceptable value; and (3) the percent decrease in C_V USE is based on 10^{18} n/cm^2 which is the lowest value in Figure 2 of RG 1.99, but the actual fluence is less than 4 x 10^{17} n/cm^2. These conservativisms can account for the 1 ft-lbf (2%) difference between the criterion and the projected value. Extrapolation of the upper limit line in Figure 2 of RG 1.99 to 4 x 10^{17} n/cm^2 increases the predicted EOL C_V USE by greater than 2%. Therefore it was determined that the C_V USE of these welds will remain above the 50 ft-lbf criterion.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii)

The C_V USE values were re-evaluated with projections to the end of the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii). The re-evaluations demonstrated that the C_V USE in the limiting material of each unit will remain above the 10 CFR 50 Appendix G acceptance criteria of 50 ft-lbf.

Table 4.2-4 STP Unit 1 Reactor Vessel Material C_V USE

Material	Chemistry		54 EFPY C_V USE at the Clad / Base Metal Interface					Ext. Beltline (Y/N)
Component	Cu (%)	Fluence (10^{19} n/cm^2)	NPWD[(1)] (ft - lb)	% Decrease in C_V USE	EOL NPWD (ft - lb)	PWD[(2)] (ft - lb)	EOL PWD (ft - lb)	
Base Metals								
Inlet Nozzle R1613-1	0.35	0.0345	140	26%	104	-	-	Y
Inlet Nozzle R1613-2	0.35	0.0345	130.5	26%	97	-	-	Y
Inlet Nozzle R1613-3	0.09	0.0345	175	11%	156	-	-	Y
Inlet Nozzle R1613-4	0.35	0.0345	128	26%	95	-	-	Y
Outlet Nozzle R1614-1	0.35	0.0345	106	26%	78	-	-	Y
Outlet Nozzle R1614-2	0.35	0.0345	114	26%	84	-	-	Y
Outlet Nozzle R1614-3	0.35	0.0345	129	26%	95	-	-	Y
Outlet Nozzle R1614-4	0.35	0.0345	118	26%	87	-	-	Y
Nozzle Shell R1607-1	0.08	0.0345	89	11%	79	-	-	Y
Nozzle Shell R1607-2	0.08	0.0345	85	11%	76	-	-	Y
Nozzle Shell R1607-3	0.07	0.0345	82	11%	73	-	-	Y
Inter. Shell R1606-1	0.04	2.85	109.5	25%	82	130	95	N
Inter. Shell R1606-2	0.04	2.85	94	25%	71	119	87	N
Inter. Shell R1606-3	0.05	2.85	105.5	25%	79	132	96	N
Lower Shell R1622-1	0.05	3.86	111	27%	81	143	104	N
Lower Shell R1622-2	0.07	3.86	122	27%	89	149	109	N
Lower Shell R1622-3	0.05	3.86	127	27%	93	148	108	N

Table 4.2-4 STP Unit 1 Reactor Vessel Material C_V USE

Material	Chemistry		54 EFPY C_V USE at the Clad / Base Metal Interface					Ext. Beltline (Y/N)
Component	**Cu (%)**	**Fluence (10^{19} n/cm^2)**	**NPWD[1] (ft - lb)**	**% Decrease in C_V USE**	**EOL NPWD (ft - lb)**	**PWD[2] (ft - lb)**	**EOL PWD (ft - lb)**	
Bottom Head Torus R1617-1	0.14	0.0341	143	14%	123	-	-	Y
Bottom Head Dome R1618-1	0.08	0.0341	128	11%	114	-	-	Y
Welds								
Upper to Inter. circ. weld seam	0.35	0.0345	70	30%	49	-	-	Y
Inter. shell long. weld	0.02	1.53	158	21%	125	-	-	N
Lower shell long. weld	0.02	3.86	158	27%	115	-	-	N
Inter. to lower circ. weld	0.02	2.84	100	25%	75	-	-	N
Lower shell to lower head circ. Weld	0.35	0.0341	70	30%	49	-	-	Y

1 USE normal to the principal working direction (NPWD).
2 USE in the principal working direction (PWD).

Table 4.2-5 STP Unit 2 Reactor Vessel Material C_V USE

Material	Chemistry		54 EFPY C_V USE at the Clad / Base Metal Interface					Ext. Beltline (Y/N)
Component	**Cu (%)**	**Fluence (10^{19} n/cm^2)**	**NPWD[1] (ft - lb)**	**% Decrease in C_V USE**	**EOL NPWD (ft - lb)**	**PWD[2] (ft - lb)**	**EOL PWD (ft - lb)**	
Base Metals								
Inlet Nozzle R2011-1	0.1	0.0328	165	11%	147	-	-	Y
Inlet Nozzle R2011-2	0.1	0.0328	136	11%	121	-	-	Y
Inlet Nozzle R2011-3	0.12	0.0328	128	13%	111	-	-	Y

Table 4.2-5 STP Unit 2 Reactor Vessel Material C_V USE

Material	Chemistry		54 EFPY C_V USE at the Clad / Base Metal Interface					Ext. Beltline (Y/N)
Component	Cu (%)	Fluence (10^{19} n/cm^2)	NPWD(1) (ft - lb)	% Decrease in C_V USE	EOL NPWD (ft - lb)	PWD(2) (ft - lb)	EOL PWD (ft - lb)	
Inlet Nozzle R2011-4	0.11	0.0328	132	12%	116	-	-	Y
Outlet Nozzle R2012-1	0.35	0.0328	132	26%	98	-	-	Y
Outlet Nozzle R2012-2	0.35	0.0328	132	26%	98	-	-	Y
Outlet Nozzle R2012-3	0.35	0.0328	121	26%	90	-	-	Y
Outlet Nozzle R2012-4	0.35	0.0328	126	26%	93	-	-	Y
Nozzle Shell R2505-1	0.05	0.0328	114	26%	84	-	-	Y
Nozzle Shell R2505-2	0.07	0.0328	124	11%	110	-	-	Y
Nozzle Shell R2505-3	0.05	0.0328	127	11%	113	-	-	Y
Inter. Shell R2507-1	0.04	2.86	109	24%	83	137	101	N
Inter. Shell R2507-2	0.05	2.86	129	24%	98	145	107	N
Inter. Shell R2507-3	0.05	2.86	122	24%	93	149	110	N
Lower Shell R3022-1	0.03	3.72	124	26%	92	141	104	N
Lower Shell R3022-2	0.04	3.72	118	26%	87	141	104	N
Lower Shell R3022-3	0.04	3.72	123	26%	91	126	93	N
Bottom Head Torus R3020-1	0.11	0.0343	86	12%	76	-	-	Y
Bottom Head Dome R3021-1	0.09	0.0343	132	11%	117	-	-	Y
Welds								
Upper to Inter. circ. weld seam	0.35	0.0328	70	30%	49	-	-	Y

Table 4.2-5 STP Unit 2 Reactor Vessel Material C_V USE

Material	Chemistry		54 EFPY C_V USE at the Clad / Base Metal Interface					Ext. Beltline (Y/N)
Component	Cu (%)	Fluence (10^{19} n/cm^2)	NPWD[1] (ft - lb)	% Decrease in C_V USE	EOL NPWD (ft - lb)	PWD[2] (ft - lb)	EOL PWD (ft - lb)	
Inter. shell long. weld G3.02	0.04	1.68	146	22%	114	-	-	N
Lower shell long. weld E3.12	0.04	3.72	101	26%	75	-	-	N
Inter. to lower circ. weld seam E3.12	0.04	2.84	101	24%	77	-	-	N
Lower shell to lower head circ. Weld	0.35	0.0343	70	30%	49	-	-	Y

1 USE normal to the principal working direction (NPWD).
2 USE in the principal working direction (PWD).

4.2.4 Pressure-Temperature (P-T) Limits

Summary Description

Appendix G of 10 CFR 50 requires that reactor vessel boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences be accomplished within established pressure-temperature (P-T) limits. These limits are established by calculations that utilize the material properties (adjusted reference temperature, ART), effects of fluence on material properties obtained from the reactor surveillance capsules, and methodology of Appendix G of ASME, Section III.

These methods depend on the limiting ART of the beltline material and cause the calculation of the P-T limit curves to be a TLAA. Withdrawal and testing of the surveillance coupons verifies that the limiting ART value used in the P-T limit curves bounds the aging of the reactor vessel material as required by Technical Specification 4.4.9.1.2.

Analysis

The current P-T limit curves and the assumed ART value are valid up to 32 EFPY. The current Technical Specification curves assume a ¼T RT_{NDT} of 91°F and a ¾T RT_{NDT} of 64°F.

These reference temperatures are based on an initial projection of the aging of intermediate shell R1606-3 to 32 EFPY.

The effects of extended beltline materials on the P-T curves were also evaluated. The RT_{PTS} of inlet/outlet nozzles for both units were calculated using conservative assumption for fluence and material properties, and the results could not demonstrate that these nozzles would not be limiting. Therefore the revision to the P-T curves necessary to extend the P-T curves beyond 32 EFPY and into the period of extended operation will need to demonstrate the nozzles will receive a fluence of less than 1×10^{17} n/cm^2 (E>1.0 MeV) or will need to consider the ART of inlet/outlet nozzles. For Unit 2, the extended beltline material for the bottom head torus, R3020-1, was shown to be the limiting material. Therefore the revision to the P-T curves will need to consider the ART of the bottom head torus.

The current P-T curves satisfactorily account for the extended beltline materials to 32 EFPY.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The STP P-T limits curves are required to be maintained and updated as necessary to maintain plant operation consistent with 10 CFR 50. The P-T limit curves will be managed, as required by the STP license. Therefore, this TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.2.5 Low Temperature Overpressure Protection

Summary Description

Low temperature overpressure protection (LTOP) is required by STP Technical Specification, Limited Condition for Operation (LCO) 3.4.9.3, and is provided by the cold overpressure mitigation system (COMS), which opens the pressurizer power operated relief valves (PORVs) at a setpoint calculated to prevent violation of the pressure-temperature limits. The design basis for LTOP is discussed in UFSAR Section 5.2.2.11.

Since the COMS setpoint is based on the P-T limit curves calculation, which is a TLAA, the calculation of the COMS setpoints and the supporting safety analyses are TLAAs. However, these LTOP analyses do not depend on any other time-dependent values beyond the ART at the critical locations and the P-T limits. Changes to the RCS P-T limit curves also require an evaluation of the LTOP temperature and PORV pressure setpoints, and supporting safety analyses.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The COMS setpoints are established in Technical Specification Figure 3.4-4, which will be revised as described in Section 4.2.4. Since any changes to the RCS P-T limit curves also require an evaluation of the LTOP enable temperature setpoint, the PORV pressure setpoint, and supporting safety analyses, the COMS setpoints and analyses will be managed in a manner consistent with the P-T limits. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3 METAL FATIGUE ANALYSIS

Summary Description

This section addresses the design of mechanical system components supported by fatigue analyses; and also of components whose design depends on an assumed number of load cycles without a calculated fatigue usage factor.

Fatigue analyses are required for piping, vessels, and heat exchangers designed to American Society of Mechanical Engineers *Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Power Plant Components*, Division 1*, Metal Components*, *Subsection NB, Requirements for Class 1 Components,* Class 1 (ASME III Class 1).

Basis of Fatigue Analyses

ASME III Class 1 design specifications define a set of static and transient load conditions for which components are to be designed. The STP operating licenses are for 40 years. The STP design specifications state that the transient conditions are for a 40-year design life. However, the fatigue analyses are based on a specified number of occurrences of each transient rather than on the design or licensed life. The design number of occurrences of each transient for use in the fatigue analyses was specified to be larger than the number of occurrences expected during the 40-year design life of the plant.

Operating experience at STP and at other similar units has demonstrated that the assumed frequencies of design transients, and therefore the number of transient cycles assumed for a 40-year life, were conservative; and that with few exceptions the design numbers are not expected to be exceeded during a 60-year life. The exceptions are addressed in the discussions of affected components in this chapter.

4.3.1 Metal Fatigue of Reactor Coolant Pressure Boundary Program

4.3.1.1 Licensing and Design Bases of the STP Component Cyclic or Transient Limit Program

The Metal Fatigue of Reactor Pressure Coolant Boundary program (B3.1) is required by STP Technical Specifications 5.7.1 and 6.8.3.f. UFSAR Section 3.9.1 discusses the design cycles as historical numbers used in the original design basis fatigue evaluations for equipment design purposes only; that are not intended to reflect operating experience. The ASME Code guidance requires that the cumulative fatigue usage factor be less than 1.0. Therefore, a higher number of occurrences may be allowable based on evaluation of actual stresses and fatigue usage factors.

No transient limits included in the Metal Fatigue of Reactor Coolant Pressure Boundary program described in this section and B3.1 have been approached or exceeded. Therefore, the program has been effective in assuring that the reactor coolant pressure boundary components have not been exposed to more transient cycles than for which they were analyzed. The Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1) will support safe operation for the period of extended operation.

The ASME Boiler and Pressure Vessel Code does not require inclusion of emergency or faulted conditions in fatigue evaluations. Therefore, the Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1) does not monitor emergency and faulted conditions.

4.3.1.2 Cycle Counting and Fatigue Management Methods

The program tracks the occurrences of the transients listed in Table 4.3-2 and manages the cumulative usage factors (CUFs) at the locations listed in Table 4.3-1 using one of the following methods:

1. The Cycle Counting (CC) monitoring method: This monitoring method does not periodically calculate CUF. Transient event cycles affecting the location (e.g. plant heatup and plant cooldown) are counted to ensure that the numbers of transient events assumed by the design calculations are not exceeded.

2. The Cycle Based Fatigue (CBF) monitoring method: This monitoring method utilizes the CC results and stress intensity ranges generated with the ASME III methods that use six stress-tensors to perform periodic CUF calculations for selected locations. The fatigue accumulation is monitored to ensure the CUF remains below the ASME allowable fatigue limit of 1.0.

The program compares the numbers of occurrences of transients from the UFSAR Table 3.9-8 to the numbers listed in the design basis fatigue analyses. The most limiting number of cycles for each transient is listed as the limiting design cycles and will be used as the limiting values for the program as listed in Table 4.3-2. The program sometimes uses a more limiting number of cycles than listed in the UFSAR because a design basis analysis was performed using the more limiting number of cycles. The program requires evaluation of the transient cycle counts and cycle based CUFs at the monitored locations listed in Table 4.3-1 at least once per fuel cycle.

4.3.1.3 Present and Projected Status of Monitored Locations

Present and Projected Cycle Count

The operating history of STP Units 1 and 2 from initial startup to year-end 2008 was reviewed in order to baseline the transient event count for the Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1). These baselined results were then extrapolated to 60 years. Table 4.3-2, includes the accumulated cycle counts through 2008 and the projection to 60 years as described below. The results illustrate that the NSSS design transients for a 40-year plant design life conservatively bound the expected number for a 60-year plant life for all transients.

Baselining Method

To capture all the necessary transient events, data from several sources were considered, and combined into a consistent event count. Event history was taken primarily from existing manual or computer-assisted cycle counting records. STP procedures define tracking requirements and record the plant cyclic transients.

Cycle Count Projection Method

The cycle projections are recalculated as part of the fatigue management program based on the most recent transient count. The baseline cycle counting results were projected to a 60-year operating life. Projected cycle counts were computed based on the actual accumulation history since the start of plant life. The cycle projections are based on a long term weighting and short term weighting to obtain the most accurate projections of the future behavior of that event.

These projections are intended to be a best estimate of the actual cycles expected. They do not represent a revision of the design basis for the STP units. The purpose of the projection is to demonstrate that the 40-year design numbers of transients are reasonable for 60 years.

Cycle-Based CUF

The locations listed in Table 4.3-1 will be monitored for fatigue usage using the Cycle-Based Fatigue method, as described in Section 4.3.1.2. Table 4.3-1 includes the locations monitored by the Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1). The program includes the NUREG/CR-6260 sample locations and the effects of the reactor coolant environment.

CUF Projection Method

The CUF projections are recalculated as part of the fatigue management program based on the most recent transient count. The Cycle-Based Fatigue CUF results will be based on the actual accumulation history since the start of plant life and will be projected to a 60-year operating life.

These projections are intended to be a best estimate of the actual CUF expected. They do not represent a revision of the design basis for the STP units. The purpose of the projection is to demonstrate that the projected cumulative fatigue usage does not exceed the design limit of 1.0 for 60 years.

Table 4.3-1 - Summary of CBF Monitored Locations in the STP Fatigue Management Program

Component	LRA Report Section
1. RPV Instrument Tubes	Section 4.3.2.1
2. RPV Studs	Section 4.3.2.1
3. Auxiliary Feedwater Nozzle, RSG 1	Section 4.3.2.7
4. Auxiliary Feedwater Nozzle, RSG 2	Section 4.3.2.7
5. Auxiliary Feedwater Nozzle, RSG 3	Section 4.3.2.7
6. Auxiliary Feedwater Nozzle, RSG 4	Section 4.3.2.7
7. RPV Wall Transition(1)(2)	Section 4.3.4
8. RPV Inlet Nozzles(2)	Section 4.3.4
9. RPV Outlet Nozzles(2)	Section 4.3.4
10. Hot Leg Surge Nozzle(2)	Section 4.3.4
11. Charging Nozzle, Normal Line(2)	Section 4.3.4
12. Charging Nozzle, Alternate Line(2)	Section 4.3.4
13. Accumulator Safety Injection Nozzle, Loop 1(2)	Section 4.3.4
14. Accumulator Safety Injection Nozzle, Loop 2(2)	Section 4.3.4
15. Accumulator Safety Injection Nozzle, Loop 3(2)	Section 4.3.4
16. RHR Inlet Nozzle(2)	Section 4.3.4
17. Containment Penetrations M62 – M65	Section 4.6

1 The RPV Wall Transition location has a larger design CUF than the RPV Bottom Head-to-Shell Juncture location designated in NUREG/CR-6260. Therefore, the RPV Wall Transition location is monitored as the bounding location.
2 NUREG/CR-6260 location. See Section 4.3.4.

Table 4.3-2 STP Units 1 and 2 Transient Cycle Count 60-year Projections

Transient Description	UFSAR Design Cycles	Program Limiting Value	Baseline Events Up to Year End 2008		Projected Events for 60-Years	
			Unit 1 (1988-2008)	Unit 2 (1989-2008)	Unit 1	Unit 2
Normal Conditions						
1. RCS Heatup at 100°F/hr	200	200	44	28	86	78
2. RCS Cooldown at 100°F/hr	200	200	43	27	85	76
3. Pressurizer Heatup at 100°F/hr	NS	200	44	28	86	78
4. Pressurizer Cooldown at 200°F/hr	200	200	43	27	85	76
5. Unit Loading at 5% of Full Power/min	U1-3,000 U2-10,300	3,000	NP(1)	NP	NP	NP
6. Unit Unloading at 5% of Full Power/min	U1-3,000 U2-10,300	3,000	NP(1)	NP	NP	NP
7. Step Load Increase of 10% of Full Power	2,000	2,000	16	10	29	18
8. Step Load Decrease of 10% of Full Power	2,000	2,000	19	12	37	24
9. Large Step Load Decrease with Steam Dump	200	200	13	13	25	26
10. Steady State Fluctuations, Initial	1.5×10^5	1.5×10^5	NP(2)	NP	NP	NP
11. Steady State Fluctuations, Random	3.0×10^6	3.0×10^6	NP(2)	NP	NP	NP
12. Feedwater Cycle at Hot Shutdown	2,000	--	--	--	--	--
Steam Generator A	--	2,000	54	72	259	488
Steam Generator B	--	2,000	47	71	227	480
Steam Generator C	--	2,000	50	70	239	474
Steam Generator D	--	2,000	50	102	239	691
13. Loop Out of Service, Normal (Active) Loop Shutdown	80	80	0	0	1	1

Table 4.3-2 STP Units 1 and 2 Transient Cycle Count 60-year Projections

Transient Description	UFSAR Design Cycles	Program Limiting Value	Baseline Events Up to Year End 2008		Projected Events for 60-Years	
			Unit 1 (1988-2008)	Unit 2 (1989-2008)	Unit 1	Unit 2
14. Loop Out of Service, Normal (Inactive) Loop Startup	70	70	NP(3)	NP	NP	NP
15. Unit Loading Between 0-15% of Full Power	500	500	NP(4)	NP	NP	NP
16. Unit Unloading Between 0-15% of Full Power	500	500	NP(4)	NP	NP	NP
17. Boron Concentration Equalization	26,400	26,400	NP(5)	NP	NP	NP
18. Refueling	80	80	15	13	42	41
19. Primary Side Leak Test	U1-120 U2-200	U1-120 U2-200	1	0	1	1
20. Secondary Side Leak Test	80	--	--	--	--	--
Steam Generator A	--	80	0	0	1	1
Steam Generator B	--	80	0	0	1	1
Steam Generator C	--	80	0	0	1	1
Steam Generator D	--	80	0	0	1	1
21. Tube Leak Test	800	Type I: 400 Type II: 200 Type III: 120 Type IV: 80	0	0	1	1
22. Turbine Roll Test	20	20	9	5	9	5
23. Charging Flow 50% Step Increase and Return	NS	24,000	7	0	140	200
Upset Conditions						
24. Loss of Load (Without Immediate Reactor Trip)	80	80	6	2	12	3

Table 4.3-2 STP Units 1 and 2 Transient Cycle Count 60-year Projections

Transient Description	UFSAR Design Cycles	Program Limiting Value	Baseline Events Up to Year End 2008		Projected Events for 60-Years	
			Unit 1 (1988-2008)	Unit 2 (1989-2008)	Unit 1	Unit 2
25. Loss of Power (Blackout; Loss of Offsite AC Power with Natural Circulation in the RCS)	40	40	4	4	6	6
26. Partial Loss of RCS Flow (Loss of One RCP)	80	80	5	4	9	11
27. Reactor Trip from Full Power, without Cooldown.	230	230	29	23	45	56
28. Reactor Trip from Full Power, with Cooldown, without Safety Injection	160	160	13	11	19	26
29. Reactor Trip from Full Power, with Cooldown, with Safety Injection	10	10	1	1	3	3
30. Inadvertent RCS Depressurization	20	20	0	0	1	1
31. Inadvertent RCS Depressurization due to Inadvertent Auxiliary Spray	10	10	0	0	1	1
32. Inadvertent Startup of an Inactive RCS Loop	10	10	0(6)	0	1	1
33. Control Rod Drop	80	80	1	3	3	8
34. Inadvertent ECCS Actuation (No Safety Injection)	60	60	4	3	6	8
35. Operating Basis Earthquake (OBE)(7)	5	5	0	0	1	1
36. Excessive Feedwater Flow	30	30	3	2	7	6

Table 4.3-2 STP Units 1 and 2 Transient Cycle Count 60-year Projections

Transient Description	UFSAR Design Cycles	Program Limiting Value	Baseline Events Up to Year End 2008		Projected Events for 60-Years	
			Unit 1 (1988-2008)	Unit 2 (1989-2008)	Unit 1	Unit 2
37. Actuation of RCS Cold Over-pressurization Mitigation System (COMS)	10	10	3	1	4	2
38. Normal Charging Letdown Shutoff and Letdown Trip	NS	60	7	18	16	54
39. Letdown Trip with Prompt Return to Service	NS	200	3	3	10	10
40. Letdown Trip with Delayed Return to Service	NS	20	3	0	9	1
41. Charging Trip with Prompt Return to Service	NS	20	10	0	15	1
42. Charging Trip With Delayed Return to Service	NS	20	0	0	1	1
Test Conditions						
43. Primary Side Hydrostatic Test	10	1	1	1	1	1
44. Secondary Side Hydrostatic Test (each generator)	10	10	1	1	1	1
Auxiliary Conditions - Accumulator Safety Injections						
45. Inadvertent RCS Depressurization with HHSI	NS	20	0	0	1	1
46. Inadvertent Accumulator Blowdown	NS	4	0	0	1	1
47. RHR Operation	NS	200	44	27	89	76
48. High Head Safety Injection	NS	54	1	0	3	1

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[1] Transients 5 and 6 "Unit Loading and Unloading at 5% of Full Power/min" are listed in UFSAR Table 3.9-8, however they are not projected and are marked as "NP." STP does not practice load following.

[2] Transients 10 and 11 "Steady State Fluctuations" are listed in UFSAR Table 3.9-8; however they are not projected and are marked as "NP." These transients do not have a significant effect on fatigue and are bounded by transients which are tracked.

[3] Transient 14 "Loop Out of Service, Normal (Inactive) Loop Startup" is listed in UFSAR Table 3.9-8; however it is not projected and is marked as "NP" because STP normal operation with one inactive loop and the reactor critical is not permitted due to the effect on the UFSAR Chapter 15 safety analysis. The 1 projected cycle of Transient 13, "Loop Out of Service, Normal (Active) Loop Shutdown" has 1 respective startup projection of Transient 32 "Inadvertent Startup of an Inactive RCS Loop."

[4] Transients 15 and 16 "Unit Loading and Unloading Between 0-15% of Full Power" are listed in UFSAR Table 3.9-8; however they are not projected and are marked as "NP." STP does not practice load following.

[5] Transient 17 "Boron Concentration Equalization" is listed in UFSAR Table 3.9-8; however it is not projected and marked as "NP." This transient is bounded by load change transients which are tracked.

[6] Transient 32 "Inadvertent Startup of an Inactive RCS Loop" is projected to 1 cycle as the respective startup to the 1 projected cycles of Transient 13, "Loop Out of Service, Normal (Active) Loop Shutdown."

[7] Earthquakes include 10 cycles for each event, UFSAR Section 3.7.3.B.2 (OBE) and 3.9.1.1.7.9 (SSE).

4.3.2 ASME III Class I Fatigue Analysis of Vessels, Piping and Components

Fatigue analyses are performed for ASME III Division 1 Class 1 components. The following subsections list all vessels, pumps, and components subject to Class 1 analyses.

- Reactor Pressure Vessel, Nozzles, Head, and Studs — Section 4.3.2.1
- Control Rod Drive Mechanisms — Section 4.3.2.2
- Reactor Coolant Pump — Section 4.3.2.3
- Pressurizer and Pressurizer Nozzles — Section 4.3.2.4
- Steam Generators, and Feedwater Nozzles — Section 4.3.2.5
- ASME III Class 1 Valves — Section 4.3.2.6
- ASME III Class 1 Piping and Piping Nozzles — Section 4.3.2.7
- Feedwater Control Valves — Section 4.3.2.12
- Reactor Pressure Vessel Internals (Subsection NG) — Section 4.3.3

ASME Section III requires no fatigue analysis for Class 2 components however, the entire pressure boundary of the STP replacement steam generators are constructed in accordance with ASME Section III requirements. The Class 1 analyses have been updated to incorporate redefinitions of loads and design basis events, operating changes, power uprate, reactor vessel head replacement, and steam generator replacement.

4.3.2.1 Reactor Pressure Vessel, Nozzles, Head, and Studs

Summary Description

The STP Units 1 and 2 reactor pressure vessels (RPVs) are designed to ASME Section III 1971 Edition with addenda through Summer 1973. The STP vessels were built and analyzed for the assumed 40-year number of transient cycles.

The STP Unit 1 RPV head was replaced in the Fall of 2009, and the Unit 2 RPV head was replaced in the Spring of 2010. The replacement reactor vessel closure heads were designed to ASME Code, Section III, 1989 Edition (no addendum). The fatigue analyses for the heads and any similarly-replaced-and-analyzed appurtenances are analyzed for the design number of transient cycles starting from the time of installation; therefore these analyses are TLAAs valid through the period of extended operation.

Analyses in support of the repair of two Unit 1 bottom-mounted instrument (BMI) nozzle repairs in 2003 are TLAAs.

Analysis

Pressure-retaining and support components of the reactor pressure vessel are subject to an ASME Boiler and Pressure Vessel Code Section III fatigue analysis. This analysis has been updated to incorporate redefinitions of loads and design basis events, operating changes, power uprate, replacement steam generators, and minor modifications. The currently-applicable fatigue analyses of these components are TLAAs. Usage factor results are shown in Table 4.3-3.

The limiting component for fatigue in the reactor pressure vessel pressure boundary and its supports is the control rod drive housing, which has a CUF of 0.890.

The closure flanges, studs, and nuts are designed for 107 tightening cycles. A cycle consists of the reactor head removal and re-installation. The number of reactor head removals and re-installations to support refueling operations in 60 years is conservatively estimated to be 80 cycles, consistent with the STP Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1). The maximum usage factor based on the designed number of transient cycles in the closure flanges is 0.0890. The maximum usage factor based on the designed number of transient cycles in the reactor studs is 0.3372, and stud hole inserts is 0.8852.

The reactor vessel primary coolant inlet and outlet nozzles and lower-head-to-shell juncture are evaluated for effects of the reactor coolant environment on fatigue behavior of these materials, consistent with NUREG/CR-6260.

Unit 1 Reactor Vessel Bottom-Mounted Instrument Nozzle (BMI) Half-Nozzle Repairs

History

The STP Unit 1 bottom-mounted instrument (BMI) nozzles are Alloy 600, attached to the clad inner surface of the reactor vessel bottom head by Alloy 182 J-groove welds. During Refuel 11 (1RE11, Spring 2003) a boric acid control program inspection discovered leaks at Unit 1 BMI Nozzles 1 and 46. The nozzles were repaired by the “half-nozzle” method. These repairs are the only Alloy 600 half-nozzle repairs at STP.

Summary

A half-nozzle repair leaves the existing flaw or flaws in the original, inner-wall J-weld in place, and also exposes the low-alloy steel base metal of the lower reactor vessel head to reactor coolant, and therefore to possible corrosion. These repairs were evaluated for growth of postulated residual flaws, fatigue, and corrosion.

The flaw growth analysis, corrosion analysis, and fatigue analysis of the BMI repairs qualify the repair for operation from the time of the repair through the period of extended operation.

The supporting analyses of postulated lamellar flaw and possible vibration effects are not time-dependent and are therefore not TLAAs, by 10 CFR 54.3(a) Criterion 3.

Disposition: Validation, 10 CFR 54.21(c)(1)(i) and Aging Management, 10 CFR 54.21(c)(1)(iii)

Validation:

The corrosion analyses, fatigue analyses, and the ASME Section XI 48-Year Flaw Growth Analysis for the BMI nozzles and lower head repairs are valid for the period of extended operation. Therefore these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

The fatigue analyses for the replacement reactor vessel closure head are valid for the period of extended operation. Therefore this TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Aging Management:

Fatigue usage factors in the reactor vessel pressure boundary do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of operational, abnormal, and upset transient events, principally on startup and shutdown transients and on vessel head flange boltup. Table 4.3-2 demonstrates that at the current rate of accumulation of operating, abnormal, and upset event cycles, including head flange boltup cycles, the 40-year number of events should be sufficient for 60 years of operation, and the calculated 40-year usage factors will not be exceeded.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in the reactor pressure vessel pressure boundary and its supports will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Table 4.3-3 Fatigue Usage Factors in the STP Reactor Pressure Vessels

Component	Unit 1 40-Year CUF	Unit 2 40-Year CUF	Unit 1 and 2, 60-Year CUF
Control Rod Drive Mechanism	0.890(1)	0.890(1)	N/A
Head Vent Pipe	0.048(1)	0.048(1)	N/A
Internals Disconnect Device Nozzle	0.419(1)	0.419(1)	N/A
Head Flange	0.0890(1)	0.0890(1)	N/A
Vessel Flange	0.0100	0.0100	0.015(3)

Table 4.3-3 Fatigue Usage Factors in the STP Reactor Pressure Vessels

Component	Unit 1 40-Year CUF	Unit 2 40-Year CUF	Unit 1 and 2, 60-Year CUF
Closure Studs	0.3372	0.3372	0.5058(3)
Stud Hole Inserts	0.8852	0.8852	1.3278(2)(3)
Head Adapter Plug	0	0	0
Inlet Nozzle	0.0342	0.0342	0.0513(3)
Inlet Nozzle Support Pad	0.025	0.025	0.0375(3)
Outlet Nozzle	0.0167	0.0167	0.0251(3)
Outlet Nozzle Support Pad	0.024	0.024	0.036(3)
Upper Shell Transition	0.0063	0.0063	0.0095(3)
Core Support Guides	0.0307	0.0307	0.0461(3)
Lower Head to Shell Junction	0.0063	0.0063	0.0095((3)
BMI Penetrations (Non-Repaired)	0.0939(4)	0.0939	0.1409(3)
BMI Penetrations (Repaired)	0.74(5)	N/A	N/A

1 This CUF is a result of the Head Replacement 40-year fatigue analysis which includes the period of extended operation and does not need to be extended to 60 years because the reactor vessel heads were replaced.

2 The 40-year design basis number of events should be sufficient for 60 years of operation; therefore the calculated 40-year usage factors will not be exceeded.

3 60-year projections are performed by multiplying the design basis CUFs by 1.5, which equal to 60 years / 40 years, unless otherwise noted.

4 This 40-year CUF does not account for the Unit 1 BMI repair. This CUF and its 60-year projection are applicable to non-repaired BMIs.

5 This CUF is a 50-year CUF which covers from the time of the Unit 1 BMI repairs through the period of extended operation and does not need to be extended to 60 years.

4.3.2.2 Control Rod Drive Mechanism (CRDM) Pressure Housings and Core Exit Thermocouple Nozzle Assemblies (CETNAs)

Summary Description

The STP Unit 1 and 2 control rod drive mechanism (CRDM) pressure housings, the core exit thermocouple nozzle assemblies (CETNAs), and the internal disconnect devices (IDDs) were replaced with the replacement reactor vessel closure heads (RRVCHs). The CRDM pressure housings and CETNAs were designed to the Class 1 requirements of the ASME Code, Section III, 1989 Edition (no addendum)

Analysis

The new CRDMs and CETNAs were qualified for 40 years, which extends the design lives beyond the period of extended operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The Unit 1 and 2 replacement reactor vessel heads including CRDMs and CETNAs were analyzed for a 40-year design life, and therefore are valid for the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

4.3.2.3 Reactor Coolant Pump Pressure Boundary Components

Summary Description

There are four Model 100 reactor coolant pumps (RCPs) for each reactor. The design and functions of the reactor coolant pumps are described in UFSAR Section 5.4.1.

The RCPs for both units were designed to the Class 1 requirements of ASME Section III, 1971, with addenda through the Summer 1973. The design code requires a fatigue analysis per NB-3222.4(e) or a fatigue waiver per NB-3222.4(d). The fatigue and fatigue waiver analyses are TLAAs because they depend in part on the assumed numbers of design basis normal and upset transient cycles.

Analysis

The components of the reactor coolant pump that form the reactor coolant pressure boundary are subject to an ASME fatigue analysis. The fatigue analyses were performed with transients consistent with those assumed in UFSAR Table 3.9-8, with additional cooling water and seal injection transients.

The analyses demonstrated code compliance for most RCP components by satisfying the six criteria for a fatigue waiver. The exceptions are those components for which the range of primary plus secondary stress intensity exceeds $3S_M$ for normal and upset conditions. These cases are described below.

Components Qualified With a Fatigue Analysis

Casing: The generic stress report resulted in a CUF of 0.4.

Thermal Barrier Flange: The generic analysis for auxiliary nozzles resulted in a CUF of 0.8287 at the holes through the thermal barrier flange.

Cooling Coils: The STP-specific stress reports resulted in a CUF of 0.25.

Seal Injection Nozzle: The generic analysis for auxiliary nozzles resulted in a CUF of 0.85.

Thermal Barrier Cooling Water Nozzle: The STP-specific stress reports resulted in a CUF 0.4525.

Seal Injection and Cooling Water Transients

Westinghouse Equipment Specifications include safety injection and thermal barrier cooling water transients that are specific to the RCP auxiliary nozzles, coiling coils, and the thermal barrier flange at the holes.

The CUF results for the cooling coils and thermal barrier cooling water nozzles are low enough to permit validation for the period of extended operation.

The fatigue analyses for the thermal barrier flange at the holes and seal injection nozzles indicate that the only transient that contributes significantly to fatigue is the step change in seal injection flow temperature (180 cycles). This transient will occur when the charging pump suction is switched from the volume control tank to the refueling water storage tank and back. STP does not operate in this manner and the equipment failure that would cause the auto-swap inadvertently has never happened. This history demonstrates that the number of transient events used and the subsequent results of the fatigue analysis should not be reached and are valid for the period of extended operation.

Effect of Plant Modifications

The fatigue and fatigue waiver analyses have been updated to incorporate redefinitions of loads and design basis events, operating changes, power uprate, and other modifications.

Disposition: Validation, 10 CFR 54.21(c)(1)(i), Projection, 10 CFR 54.21(c)(1)(ii) and Aging Management, 10 CFR 54.21(c)(1)(iii)

Validation of Components

The fatigue analyses for the thermal barrier flange at the holes and seal injection nozzles include step changes in the seal injection water temperature. The transient accounts for switching the charging pump suction from the volume control tank to the refueling water storage tank and back. STP does not operate in this manner and there have been no events of this transient in the history of STP operation. Therefore the number of transient events is valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Projection of Fatigue

The fatigue analyses of the RCP casing, thermal barrier cooling coils, and the thermal barrier water nozzles demonstrate a low CUF based on 40-year design transients. The results extrapolated to 60 years by multiplying the CUFs by 1.5 still satisfy the design requirement of less than 1.0. Therefore these fatigue analysis are valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

Aging Management for RCP Fatigue Waiver

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue on the RCP pressure-retaining components will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.4 Pressurizer and Pressurizer Nozzles

Summary Description

The Westinghouse Series 100 pressurizers are vertical cylindrical vessels with hemispherical top and bottom heads, constructed of carbon steel, with austenitic stainless steel cladding on all surfaces exposed to the reactor coolant. The pressurizers and their integral support skirts are Code Class 1, designed to ASME Section III, 1974 Edition.

Analysis

Pressure-retaining and support components of the pressurizer are subject to an ASME Section III fatigue analysis. This analysis has been revised for plant modifications with redefined loads, and for newly-identified design basis events not included in the original analyses. The fatigue analyses of the pressurizers and their closures, nozzles, heaters, and integral support skirts are TLAAs.

Table 4.3-4 presents the results of the fatigue analyses from STP Units 1 and 2 pressurizer stress reports, which qualify them to the ASME Section III, Class 1 requirements. The fatigue analyses were performed with transients consistent with those assumed in UFSAR Table 3.9-8. The analyses of record and Table 4.3-4 include effects of subsequent design and analysis changes described below.

Table 4.3-4 STP Units 1 and 2 Fatigue Usage Factors

Component	40-Year CUF	60-Year CUF (1.5 x 40-Year)
Surge Nozzle	U1 = 0.6831 U2 = 0.7695	U1 = 1.025(1) U2 = 1.154(1)
Spray Nozzle	0.628	0.942
Safety and Relief Nozzle	0.044	0.066
Lower Head Heater Penetration	U1 = 0.9418 U2 = 0.8352	U1 = 1.413(1) U2 = 1.253(1)
Upper Head and Upper Shell	0.735	1.1025(1)
Lower Head to Shell Weld	U1 = 0.5979 U2 = 0.5423	U1 = 0.897 U2 = 0.813
Support Skirt	0.500	0.750
Seismic Support Lug (at Shell Inside Surface)	0.290	0.435
Manway (Maximum CUF, Including Cover and Bolts)	0.875	1.3125(1)
Instrument Nozzle	0.915	1.3725(1)
Immersion Heater	0.473	0.7095
Valve Support Bracket	0.688	1.032(1)
Trunnion to Shell Buildup	0.702	1.053(1)

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1 The 40-year design basis number of events should be sufficient for 60 years of operation; therefore the calculated 40-year usage factors will not be exceeded.

Effect of New Design Basis Transients and Plant Modifications

Cold Overpressure Mitigation System Transient

The stress reports evaluated the effect on the pressurizers of 10 cold over-pressurization mitigation system activation events. The contribution of these thermal effects to the fatigue usage can be neglected.

However, two components, the safety and relief nozzles and the manway, were previously exempt from a fatigue analysis by a waiver under ASME, Section III, NB-3222.4(d). With an additional 6,000 pressure fluctuations (10 events with 600 pressure cycles per event), these components were no longer exempt from the fatigue analysis requirement. Fatigue usage factors are therefore now included in the analysis results for these components, as shown in Table 4.3-4.

Insurge-Outsurge Transients

The effects of insurge-outsurge transients were evaluated for license renewal. The design transients were derived from WCAP-14950 and plant operations from the last 7 heatups and 7 cooldowns for Units 1 and 2 combined. These heatups and cooldowns are assumed to represent all past and future operations in terms of pressurizer insurge-outsurge and surge line stratification activity. This is reasonable because the STP heatup and cooldown procedures have been consistent with MOP recommendations for the entire life of the plant. Consistent with MOP operation, the maximum system ΔT for either Unit is limited to 320°F. All components were qualified using the 40-year current licensing basis cycles and incorporated into the Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1). The results have been incorporated into Table 4.3-4. Differences between the Units 1 and 2 results are due to different insurge-outsurge characteristics observed during plant heatups and cooldowns, and different pipe support configurations prior to 1989. In January 1989 Unit 1 modified the surge line from a two rigid-support configuration to a one rigid-support configuration. Unit 2 has only had the one rigid-support configuration.

Pressurizer Spray, Relief, Safety, and Surge Nozzle Preemptive Overlays

In order to mitigate the susceptibility of the STP pressurizer spray, relief, safety, and surge nozzles to PWSCC, STP performed preemptive structural weld overlays (SWOLs) in both units. To support these mitigating actions, relief request RR-ENG-2-43 was requested from and approved by the NRC.

The requested relief invokes Code Case N-504-2, Code Case N-638-1, Code Case N-416-2 and certain requirements of ASME Section XI, Appendix VIII, Supplement 11. The implementation of the code cases was supported by crack growth analyses. These analyses were performed with the transients listed in UFSAR Table 3.9-8 spread evenly over the 40-year and 60-year plant life. These analyses determine the amount of time necessary for a crack to propagate from ¾ wall thickness to the SWOL interface. This acceptance criterion is to verify that an unidentified crack will not propagate to the SWOL interface during a 10-year in-service inspection interval. If not satisfied, then an inspection interval is to be established to ensure that a crack will not propagate to the SWOL prior to the next inspection. Since the crack is not qualified for the life of the plant, but only the inspection interval, the fatigue crack growth analysis is not a TLAA in accordance with 10 CFR 54.3(a), Criterion 3.

The SWOL calculation demonstrated that the SWOLs on the pressurizer nozzles do not have any adverse effect on the existing stress qualification and would still meet the applicable ASME Section III requirements. Reconciliation of the existing fatigue evaluations was performed for the limiting locations outside the SWOL. In the region within the SWOL, the stresses due to pressure and piping reaction loads are lower due to the increase in the pipe wall thickness as a result of the structural weld overlay. Therefore these stress evaluations are not TLAAs in accordance with 10 CFR 54.3(a), Criterion 2.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii); and Aging Management, 10 CFR 54.21(c)(1)(iii)

Projection of Fatigue for Pressurizer Subcomponents with Low 40-Year Design Basis Usage Factors

As shown in Table 4.3-4, the fatigue analyses of the safety and relief nozzles, and the seismic support lugs demonstrate worst-case 40-year usage factors less than 0.4. When multiplied by 1.5 (60/40) to account for the 60-year period of extended operation, these results do not exceed 0.6, providing a large margin to the code acceptance criterion of 1.0. These analyses are projected for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

Aging Management for Pressurizer Subcomponents

The fatigue analyses of the remaining subcomponents have been found acceptable for a limiting number of transient events. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in these pressurizer subcomponents will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.5 Steam Generator ASME III Class 1, Class 2 Secondary Side, and Feedwater Nozzle Fatigue Analyses

Summary Description

The Unit 1 and 2 steam generators at STP were replaced (in 2000 and 2002, respectively) with Westinghouse Model Delta 94 steam generators and are designed for 40 years of operation (2040 and 2042, respectively), based on design transients. The RSGs are designed and fabricated to the requirements of ASME Boiler and Pressure Vessel Code Section III, 1998 Edition with no Addenda. The primary side of each RSG is ASME Class 1, and the secondary side of each RSG is ASME Class 2. However, the entire pressure boundary of the component is constructed in accordance with ASME Boiler and Pressure Vessel Code Section III Class 1 requirements.

Analysis

Summary of RSG Component Analysis Usage Factors

The analyses of the RSGs show that the usage factors of the steam generator components are less than the allowable 1.0, as shown in Table 4.3-5, except the manway studs which are qualified by fatigue tests. Fatigue usage factors in the steam generator components do not depend on flow-induced vibration or other effects that are time-dependent at steady-state conditions, but depend only on effects of operational and upset transient events specified in the design specification.

Table 4.3-5 STP Replacement Steam Generator Project Stress Report Fatigue Summary

Component	Unit 1 RSG 40-Year CUF	Unit 2 RSG 40-Year CUF
Primary Chamber, Tubesheet, Stub Barrel Complex	0.98	0.98
Primary Nozzles	0.821	0.859
Primary Manway	0.082	0.178
Primary Manway Studs	7.13(1)	7.13(1)
Primary Chamber Divider Plate	0.34	0.35
Tube to Tubesheet Weld	0.854	0.89
Tubes	0.91	0.95
Upper Shell, Transition Cone and Lower Shell	0.276	0.276
Handhole	0.50853	0.50853
4-inch Inspection Port	--	--
Shell and Pad	0.63824	0.63824
Cover	0.04553	0.04553
Bolts	0.45318	0.45318
Minor Shell Taps	0.65	0.65
2-inch Inspection Port	--	--
Shell and Cover	0.4790	0.4790
Studs	0.743472	0.743472
Feedwater Nozzle and Thermal Sleeve	0.0728	0.0728
Auxiliary Feedwater Nozzle and Thermal Sleeve	0.4366	0.4366
Secondary Manway; Pad, Cover, and Weld	0.666	0.666
Secondary Manway Bolt	0.279	0.279

Table 4.3-5 STP Replacement Steam Generator Project Stress Report Fatigue Summary

Component	Unit 1 RSG 40-Year CUF	Unit 2 RSG 40-Year CUF
Steam Outlet Nozzle	--	--
Nozzle	0.254	0.254
Flow Limiter Insert and Weld	0.353	0.353
Lower Internals	--	--
Shell Shear Lugs	0.021	0.016
Wrapper Position Block	0.00	0.00
Anti-Rotation Key	0.026	0.029
Blowdown Pipe	<0.72	<0.72
Feedring, Feedring Supports and Spray Nozzle	0.98	0.98
Upper Internals (Limiting Locations)	--	--
Separator to Lower Deck Plate Weld	0.07	0.07
Shear Panel to End Channel Weld	0.005	0.005
Tube to Tubesheet Joint for the Locked Tube Condition	0.263	0.27

1 Fatigue usage exceeds the allowable of 1.0. Bolts and Studs are qualified for 40 years by fatigue testing.

Effects of Power Uprate, and COMS on the Replacement Steam Generator Analyses

Power Uprate

Westinghouse evaluated the thermal-hydraulic performance and structural integrity of the replacement Model Delta 94 steam generators. The conclusion states there is no need to revise any data point on the design transient curves as a result of the 1.4% uprating. As such, the original design transient curves remain applicable. The structural evaluation focused on critical steam generator components as determined by the stress ratios and fatigue usage as reported in the analyses of record. By demonstrating that these most highly stressed components remain qualified for operation at the uprated power conditions, it may be concluded that these steam generator components remain structurally qualified. Since the steam generator primary stresses remain the same and the secondary pressures are reduced, as a result of uprating, all other steam generator components also remain structurally qualified.

RCS Cold Over-Pressure Mitigation System (COMS)

The Replacement Steam Generator program added a new upset transient, RCS Cold Over Pressure Mitigation System (COMS), to the original STP design basis for the reactor coolant system. This transient has since been added to the UFSAR list of transients. This transient potentially occurs during startup or shut down conditions at low temperatures. For design purposes this transient was assumed to occur 10 times during the 40-year design life.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The fatigue usage factors in the replacement steam generator components do not depend on effects that are time dependent at steady-state conditions, but depend only on effects of operational, abnormal, and upset transient events. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in replacement steam generator components will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.6 ASME III Class 1 Valves

Summary Description

STP Class 1 valves are designed to ASME III, Subsection NB, 1974 Edition with Summer 1975 addenda (pressurizer safety and control valves) or the 1974 Edition with Winter 1975 addendum (motor-operated, manual valves 3” and larger, and all valves 2” and smaller). ASME Section III requires a fatigue analysis only for Class 1 valves with an inlet piping connection greater than four inches nominal pipe size.

Analysis

Code Fatigue Analyses

Fatigue analyses or evaluations were performed for the valves listed in Table 4.3-6:

Table 4.3-6 Summary of STP Class 1 Valve Fatigue Analyses

Valve, Specification, and Analysis Descriptions	Calculated Ops N_A for NB-3545.3 Normal Duty[1]	Maximum CUF I_t for NB-3550 Cyclic Loads[1]
6" Pressurizer Safety Relief Valves	>2,000	$I_{t\ 40}$ = 0.0276 $I_{t\ 60}$ = 0.0414
12" RHR Pump Suction Isolation Valves	>2,000	$I_{t\ 40}$ = 0.64 $I_{t\ 60}$ = 0.96
6" Hi Head Safety Injection Pump Discharge Check Valves	>2,000	$I_{t\ 40}$ = 0.15 $I_{t\ 60}$ = 0.225
8" Hi Head Safety Injection Pump Discharge Check Valves	>2,000	$I_{t\ 40}$ = 0.14 $I_{t\ 60}$ = 0.21
8" Lo Head Safety Injection To Hot Leg Check Valves	>2,000	$I_{t\ 40}$ = 0.14 $I_{t\ 60}$ = 0.21
12" Safety Injection To Cold Leg Injection Check Valves and Safety Injection Accumulator Outlet Valves	>2,000	$I_{t\ 40}$ = 0.05 $I_{t\ 60}$ = 0.075
8" Lo Head Safety Injection Train A/B/C To Loop 1(2)A/B/C Cold Leg Check Valve	>2,000	$I_{t\ 40}$ = 0.14 $I_{t\ 60}$ = 0.21
2" CVCS Auxiliary Spray Check Valves	>2,000	$I_{t\ 40}$ = 0.2063 $I_{t\ 60}$ = 0.3095
2" RCP Seal Injection First Check Valves and RCP Seal Injection Second Check Valves	>2,000	$I_{t\ 40}$ = 0.2186 $I_{t\ 60}$ = 0.3279
3" X 6" Pressurizer Power Operated Relief Valve	-	$I_{t\ 40}$ = 0.16 $I_{t\ 60}$ = 0.24

1 N_A and I_t were calculated for the design basis number of loading events applicable to the component that were originally intended to encompass a 40-year design life. The 60 year CUF ($I_{t\ 60}$) were calculated by multiplying the 40 year CUF ($I_{t\ 40}$) by 1.5 (60/40).

Disposition: Projection, 10 CFR 54.21(c)(1)(ii); and Aging Management, 10 CFR 54.21(c)(1)(iii)

Projection of Fatigue - Valves with Margin

The calculated worst-case usage factors for the following valves indicate that the pressure boundaries would withstand fatigue effects for at least 1.5 times the original design lifetimes:

- 6" pressurizer safety relief valves,
- 6" hi-head safety injection pump discharge check valves,
- 8" hi-head safety injection pump discharge check valves,
- 8" lo-head safety injection to hot leg check valves,
- 12" safety injection to cold leg injection check valves,

- 12” safety injection accumulator outlet valves,
- 2” CVCS auxiliary spray check valves,
- 2” RCP seal injection first check valves, and
- 2” RCP seal injection second check valves.

The design of these valves for fatigue effects is therefore valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii)

Aging Management - RHR Pump Suction Isolation Valves

The fatigue usage factors in these valves do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of operational, abnormal, and upset transient events. Therefore the increase in operating life to 60 years will not have a significant effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in Class 1 valve pressure boundaries will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.7 ASME III Class 1 Piping and Piping Nozzles

Summary Description

STP Class 1 reactor coolant main loop piping, surge line piping and other ASME III Class 1 piping is designed to ASME Section III, Subsection NB, 1974 Edition with addenda through Winter 1975. The Class 1 piping fatigue analyses were performed to the ASME III, Subsection NB-3600 and 3200, 1974 Edition with addenda through Winter 1975. The currently-applicable fatigue analyses of these components are TLAAs.

Analysis

Summary of Class 1 Piping Analysis Usage Factors

All Class 1 piping, Class 1 nozzles, and Class 1 thermowells were analyzed using the 40-year design transients. The most limiting calculated design basis usage factors occur in the 6" pressurizer safety lines and approach the limit of 1.0.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The most limiting calculated design basis usage factors occur in the pressurizer safety lines and approach the limit of 1.0. However, fatigue usage factors in these components do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of normal, upset, and emergency transient events. Therefore the increase in operating life to 60 years will not have a significant effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients remain below the number actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in Class 1 piping and piping nozzles will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.8 Response to NRC Bulletin 88-08: Intermittent Thermal Cycles due to Thermal-Cycle-Driven Interface Valve Leaks and Similar Cyclic Phenomena

Summary Description

NRC Bulletin 88-08 describes the mechanism of thermal cycles in normally-isolated, dead-end branches, due to leaking interface valves. Because valves often leak, an unrecognized phenomenon and possibly unanalyzed cyclic thermal stresses on valves, piping, and nozzles may exist for those reactors with these conditions. Under these conditions, thermal fatigue of the un-isolable piping can result in crack initiation.

Analysis

In 1988, as identified in NRC Bulletin 88-08, there were several instances of thermal fatigue cracking in normally stagnant lines attached to reactor coolant system piping. This issue was addressed by utilities by conducting evaluations and monitoring to ensure that further leakage would not occur.

Three systems for STP Units 1 and 2 could be subjected to the phenomena described in NRC Bulletin 88-08: normal charging, alternate charging, and auxiliary spray.

Normal Charging, Alternate Charging, and Auxiliary Spray Lines

To assure that the piping was not subject to combined cyclic and static thermal and other stresses, STP implemented a monitoring program. The data from the program showed that stratification was occurring, but thermal cycling was not occurring.

Thermal Stratification

The observed stratification of the charging, alternate charging, and auxiliary spray lines was evaluated; and demonstrated that the ASME limit would not be reached during the life of the plant. Evaluations of the charging, alternate charging, and auxiliary spray lines for thermal stratification determined incremental fatigue usage increase of less than 0.001 for the charging and alternate charging lines, and less than 0.03 for of the auxiliary spray lines. These evaluations are based on 40-year design transient cycles and are therefore TLAAs.

Thermal Cycling

The NRC staff safety evaluation of the STP lines concluded that the normal charging, alternate charging, and the auxiliary spray lines at STP are not susceptible to the thermal cycling phenomenon described in NRC Bulletin 88-08. The CVCS system is separated from the safety injection system and only hot water can leak through the charging and auxiliary spray lines, reducing the potential for thermal cycling. Temperature monitoring of these lines may discontinue, provided periodic in-service inspection is performed with a frequency consistent with the standard ASME Section XI recommendations (10 years). The inspection interval is independent of the life of the plant, therefore any supporting analyses are not TLAAs in accordance with 10 CFR 54.3(a), Criterion 3.

RHR Lines

Westinghouse compared the STP and Genkai RHR lines and determined that it is very unlikely for thermal cycling phenomenon as described in NRC Bulletin 88-08, Supplement 3 to occur.

The safety determination does not consider the effects of aging. Therefore the evaluation of the RHR line is not a TLAA in accordance with 10 CFR 54.3(a), Criterion 2.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii)

The low usage factors of the charging, alternate charging, and auxiliary spray lines due to thermal stratification demonstrate that this analysis can be projected for the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

4.3.2.9 Response to NRC Bulletin 88-11: Revised Fatigue Analysis of the Pressurizer Surge Line for Thermal Cycling and Stratification

Summary Description

The purpose of NRC Bulletin 88-11 is to request that addressees establish and implement a program to confirm pressurizer surge line integrity in view of the occurrence of thermal stratification and require addressees to inform the staff of the actions taken to resolve this issue.

The surge line was originally designed to ASME Section III, Subsection NB, 1974 Edition with addenda through Winter 1975. The surge line design was reevaluated to the 1986 Code in response to NRC Bulletin 88-11 thermal stratification concerns.

Analysis

Effects of Thermal Stratification on the Surge Line Piping Fatigue Analysis

In response to NRC Bulletin 88-11, Westinghouse performed a generic analysis of all domestic Westinghouse PWRs and a plant-specific evaluation of the STP pressurizer surge lines. The surge line stratification program for STP Units 1 and 2 performed ASME III stress, fatigue cumulative usage factor, fatigue crack growth, and leak-before-break analyses. New fatigue usage factors were calculated with thermal transients redefined to account for thermal stratification. The design basis number of cyclic events was unchanged; however a simplified elastic-plastic analysis was performed per NB-3653.6, which resulted in a lower CUF than previous evaluations.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The revised fatigue analyses do not depend on effects that are time-dependent at steady-state operation, but depend only on effects of operational, abnormal, and upset transient conditions. The increase in operating life to 60 years will not have a significant effect on these fatigue analyses so long as the number of cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue on the pressurizer surge line will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.10 High Energy Line Break Postulation Based on Fatigue Cumulative Usage Factor

Summary Description

Branch Technical Position (BTP) MEB 3-1 provides guidance for determining the types and locations of postulated high-energy line breaks outside containment, and has historically been used for the same purpose inside containment. BTP MEB 3-1 guidance for ASME III

Class 1 piping requires postulating breaks at intermediate locations where the design basis usage factor equals or exceeds 0.1.

UFSAR Section 3.6.1 states that selection of pipe failure locations and evaluation of the consequences on nearby essential systems, components, and structures are presented and are in accordance with the requirements of 10 CFR 50, Appendix A, GDC 4. Selections and evaluations are in accordance with the guidance of NRC BTP MEB 3-1.

Analysis

With the exception of the reactor coolant system primary loops, to which a leak-before-break (LBB) analysis applies, breaks in piping with ASME Section III Class 1 fatigue analyses are identified based on a limiting stress criterion; and on a cumulative usage factor criterion. The postulation of break locations based on the fatigue criterion is a TLAA. No additional break locations will result from license renewal as long as the current design basis cumulative usage factor analyses remain valid.

Increased CUF for Break Consideration

Westinghouse justified elimination of break locations in the accumulator safety injection lines and the pressurizer surge line based on increasing the CUF for break consideration from 0.1 to 0.4. Vibration testing was performed to confirm that the level of alternating stress was well below the level required to produce crack growth. STP also provided the results of fatigue crack growth analyses for the pressurizer surge line. These fatigue crack growth analyses established that flaws would not reach the flaw depths allowed in paragraph IWB-3640 of the ASME code during the plant life.

In the matter of increasing the minimum acceptable value of CUF to 0.4, the NRC staff concluded that a generic use of 0.4 is unacceptable. In a letter dated December 31, 1986, the staff informed STP that 40 specific breaks in the pressurizer surge line and the safety injection lines need not be postulated although the CUF values exceeded 0.1.

The analyses that evaluated fatigue crack growth and cumulative usage factor in the pressurizer surge line, and the accumulator safety injection line depend on the standard number of cycles for a 40 year reactor lifetime. Therefore these analyses are TLAAs.

In response to NRC Regulatory Issue Summary (RIS) 2010-07 Westinghouse performed a plant specific evaluation of STP Units 1 and 2 pressurizer surge line analyses for the effects of PWSCC. The evaluation determined that the original analysis conclusions remain valid and the pressurizer surge line pipe breaks should not be considered in the structural basis of STP Units 1 and 2 after weld overlay application.

Elimination of Arbitrary Intermediate Breaks in Class 2 and 3 Piping

The NRC also approved the elimination of arbitrary intermediate breaks. Elimination of the arbitrary intermediate breaks required a commitment by STP to consider fatigue effects in welded integral attachments to Class 2 and 3 piping. STP performed an analysis, which considered fatigue effects for welded attachments to Class 2 and 3 piping in accordance with paragraph NC/ND-3645 of the ASME code. Detailed stress and fatigue analyses were performed for five integral pipe supports that were determined to be bounding.

The analyses which calculated usage factors are based on the standard set of 40-year cycles; therefore, these analyses are TLAAs.

When the usage factors are multiplied by 1.5 to extend the analyzed life to 60 years, two of the five integral welded attachments will possibly experience CUFs greater than 1.0 during the period of extended operation. These are the pipe supports in the main feedwater system, and in the charging system. The remaining three supports are validated for license renewal because their 60 year CUF values show a large margin from 1.0.

The main feedwater piping support fatigue will be managed by cycle counting. The fatigue usage of the charging nozzle will bound the fatigue usage of the integral attachments. Therefore the monitoring of the charging nozzle is sufficient to assure that the charging system piping support will not exceed the Code allowable value.

Break Exclusion Zones

STP has containment penetration break exclusion regions (“no break zones”) for the Main Steam and Feedwater systems, in the containment penetration piping between the penetration and containment isolation valves. These zones contain no ASME Section III Class 1 piping with fatigue analyses. Therefore their qualification is based only on calculated stress, and the break locations in these “no break zones” are independent of time and are not supported by a TLAA by 10 CFR 54.3(a), Criterion 3.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii); and Aging Management, 10 CFR 54.21(c)(1)(iii)

Projection of Fatigue of Other Welded Attachments to Class 2 and 3 Lines

Other than those for the charging system and the main feedwater system, the fatigue analyses for the welded attachments to Class 2 and 3 piping which support the elimination of arbitrary intermediate break locations demonstrate a CUF less than 1.0 during the period of extended operation. Therefore these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

Aging Management of Class 1 Break Locations and Welded Attachments to Charging and Main Feedwater Lines

Break locations which depend on usage factor will remain valid as long as the numbers of cycles assumed by the analysis are not exceeded. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The program also ensures that the charging line weld attachments CUF will be below the Code allowable. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.2.11 Fatigue Crack Growth Assessments and Fracture Mechanics Stability Analyses for Leak-Before-Break (LBB) Elimination of Dynamic Effects of Primary Loop Piping Failures

Summary Description

A leak-before-break analysis eliminated the need to postulate longitudinal and circumferential breaks in the reactor coolant system primary loop piping, under a 10 CFR 50.12 exemption. Elimination of these breaks omitted the need to install pipe whip restraints in the primary loop and eliminated the requirement to design for dynamic (jet and whip) effects of primary loop breaks. The containment pressurization, emergency core cooling system, and environmental qualification large-break design bases were not affected.

NRC approval of the use of leak-before-break in the reactor coolant system primary loop piping was granted with STP SER, NUREG-0781, Supplement No. 2.

Analysis

The STP LBB analysis demonstrates that reactor coolant system primary loop pipe breaks are highly unlikely and need not be included in the design basis because flaws in reactor coolant system piping would have significant leaks for extended periods before developing into a large break. Such flaws would be detected by the reactor coolant pressure boundary leak detection system long before they become full size breaks.

Fatigue Crack Growth Analyses

Primary Coolant System

The final LBB submittal for STP included a fatigue crack growth assessment for a range of materials at a high stress location bounding the primary coolant system. The submittal concluded that the effects of low and high cycle fatigue on the integrity of primary piping are negligible.

Fracture Mechanics Evaluation

The STP leak-before-break analysis for the primary loop, includes a fracture mechanics evaluation which depends on the crack initiation energy integral, J_{IN}. The primary coolant loops at STP are SA 351 Grade CF8A cast stainless steel, which at PWR operating temperatures is subject to time-dependent thermal embrittlement reducing the J_{IN} integral.

Thermal embrittlement effects depend logarithmically on time (more rapid initially, approaching a saturation value over time). The Westinghouse LBB analysis for the primary loop cites a study which determined the effects of thermal aging on piping integrity for a material at thermal embrittlement saturation. Therefore the fracture mechanics evaluation is dependent on material properties not plant life and therefore, is not a TLAA by 10 CFR 54.3(a), Criterion 3.

Effects of Power Uprate and Steam Generator Replacement on the LBB Analysis

The Westinghouse power uprate report determined that power uprate had no effects on the LBB analysis for the primary loop piping, the pressurizer surge line, or the accumulator lines.

Westinghouse determined that the conclusions of the previous LBB analysis for the reactor coolant piping, pressurizer surge line, and accumulator lines remain valid after steam generator replacement.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The LBB analysis found that fatigue crack growth effects will be negligible. The basis for evaluation of fatigue crack growth effects in the LBB analysis will remain unchanged so long as the number of transient occurrences remains below the number assumed for the analysis of fatigue crack growth effects.

The Metal Fatigue of the Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients remain below the number actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii). Continuation of the 10 CFR 50.12 LBB exemption is therefore justified for the period of extended operation.

4.3.2.12 Class 1 Design of Class 3 Feedwater Control Valves

Summary Description

The STP feedwater control valves were purchased as ASME III, Class 3 valves. UFSAR Table 3.2.B-1 identifies the safety class as non-nuclear safety (NNS). Neither of these classifications indicates a TLAA. However UFSAR Table 3.9-8 associates a limiting number of occurrences of unit loading and unloading at 5% of full power for these valves, and the methods and acceptance criteria for the evaluation of the valves for these occurrences were based on Class 1 methods of paragraph NB-3545 of ASME III, 1977 Edition through the Winter 1978 Addenda.

Because the current licensing basis indicates a lifetime limit on the feedwater control valves, the analysis which supports their design is a TLAA.

Analysis

Westinghouse Equipment Specifications require that these valves be designed to transients consistent with the STP 40-year design. However, as a result of the STP replacement steam generator project, the main feedwater control valves were analyzed for a new set of operating design transient conditions, and it was found that they could not be qualified for the full number of loading and unloading transients defined for the life of the plant. To obtain acceptable fatigue limits the number of loadings and unloadings between 15 and 100 percent power had to be reduced from 13,200 to 10,300, of loading or unloading for Unit 2. This limit does not apply to design of the Unit 1 feedwater control valves.

Loading and unloading events are the largest contributor to fatigue in the feedwater control valves. All other transients contribute 0.055 to the 40-year CUF. The STP units do not operate in a load-following mode, and therefore the expected number of occurrences is only a small fraction of the design number of occurrences.

STP has experienced 62 occurrences of this transient for Unit 1 and 43 occurrences for Unit 2 through July 27, 1989, less than 17% of the 385 anticipated at that point in the design life. That ratio applied to the design number for 40 years, 17% of 13,200, is 2,244 occurrences. This value can be extrapolated to 60 years by multiplying it by 1.5 (60/40), resulting in 3,366 events over 60 years. This demonstrates a large margin between the analyzed value, 10,300, and the number projected, 3,366; thus the analysis is valid for the period of extended operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The STP units do not operate in a load following mode and therefore the expected number of loading and unloading occurrences is only a small fraction of the design number of occurrences, resulting in a large margin between the analyzed value, 10,300 cycles, and the number projected, 3,366 cycles. Therefore the fatigue analysis for the STP feedwater control valves is valid for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

4.3.3 ASME Section III Subsection NG Fatigue Analysis of Reactor Pressure Vessel Internals

Summary Description

The reactor internals support the core, maintain fuel alignment, limit fuel assembly movement, maintain alignment between fuel assemblies and CRDMs, direct coolant flow past the fuel elements, direct coolant flow to the RPV head, provide gamma and neutron shielding, and guide the incore instrumentation.

The STP reactor vessel internals were designed to meet the intent of the 1974 Edition of Section III of the ASME Boiler and Pressure Vessel Code, Subsection NG, paragraph NG-3311(c); that is, design and construction of core support structures meet Subsection NG in full, and other internals are designed and constructed to ensure that their effects on the core support structures remain within the core support structure limits.

Analysis

Flow-Induced Vibration in the Reactor Vessel Internals (Not a TLAA)

Protection from flow induced vibration is ensured via testing. The STP UFSAR Section 3.9.2.3 discusses the dynamic response analysis of reactor internals under operational flow transients and steady-state conditions.

The Indian Point No. 2 plant was the prototype for a four-loop plant internals verification program and was fully instrumented and tested during hot functional testing. In addition, the Trojan plant and Sequoyah No. 1 plant provided prototype data applicable to STP Units 1 and 2. STP Units 1 and 2 are similar to Indian Point No. 2; the only significant differences are the modifications resulting from (1) the replacement of the annular thermal shield with neutron shielding pads, (2) the change to the UHI-style inverted top hat support structure configurations, and (3) the use of 17 x 17 extended length fuel. These differences were addressed and a detailed review of the STP reactor pressure vessel internals load combinations, allowable stress limits, and other design criteria for vibration effects was not performed because of the plant's similarity to other Westinghouse plants that were found acceptable.

The licensing basis does not describe any time-limited effects for a licensed operating period associated with flow-induced vibration. Therefore there are no TLAAs, in accordance with 10 CFR 54.3(a), Criteria 2 and 3.

Fatigue Analyses Including Effects of Power Uprate and Steam Generator Replacement

Westinghouse evaluated the Unit 1 and 2 reactor vessel internals for the effect of the 1.4% uprating, replacement steam generators, the conversion to T_{cold} upper head operating conditions with robust fuel assemblies, and tube support pin replacement. The flow-induced vibration stress levels were calculated and are shown to be well below the material high-cycle fatigue endurance limit. Assessment of core support structures limiting margins of safety and fatigue usage factors resulted in meeting ASME Code allowable values as shown in Table 4.3-7.

Table 4.3-7 Reactor Vessel Internals CUF Results

Component	Limiting 40-Year CUF	
	Unit 1	Unit 2
Lower Core Support Plate	0.00	0.00
Baffle, Former Assembly	$<1_{(test)}$	$<1_{(test)}$
Core Barrel Assembly	0.389	0.389
Radial Keys and Clevis Inserts	0.11	0.11
Upper Support Assembly	0.175	0.175
Upper Core Plate	0.80	0.80
Upper Support Column	0.41	0.41
Instrumentation Port Column Assemblies	0.064	0.064

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The Subsection NG fatigue usage factors for reactor vessel internals do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of normal, upset, and emergency transient events. Therefore the increase in operating life to 60 years will not have an effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients remain below the number actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue in the reactor vessel internals will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.4 Effects of the Reactor Coolant System Environment on Fatigue Life of Piping and Components (Generic Safety Issue 190)

Summary Description

NUREG-1800, Section 4.3.1.2 states that consideration of the effects of coolant environment on component fatigue life for license renewal is an area of review, noting the staff recommendation that the samples in NUREG/CR-6260 should be evaluated considering environmental effects for license renewal.

STP addressed GSI-190 review requirements by assessing the environmental effect on fatigue at the NUREG/CR-6260 locations for newer-vintage Westinghouse Plants.

Analysis

NUREG/CR-6260 identifies seven sample locations for newer-vintage Westinghouse plants:

- Reactor vessel lower head to shell juncture
- Reactor vessel inlet nozzle
- Reactor vessel outlet nozzle
- Surge line hot leg nozzle
- Charging nozzle
- Safety injection nozzle
- Residual heat removal line inlet transition

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 includes cycle counting of transients affecting all of the NUREG/CR-6260 specified locations. In addition, the Metal Fatigue of Reactor Coolant Pressure Boundary program (B3.1) calculates the usage factors from actual plant transient accumulation in all of the NUREG/CR-6260 locations based on the cycle-based fatigue (CBF) methodology.

Three of the NUREG/CR-6260 sample locations in Table 4.3-8, (1) RPV Wall Transition, (2) RPV Inlet Nozzle, and (3) RPV Outlet Nozzle, have a 60-year Environmental Assisted Fatigue (EAF) CUF below 1.0, when multiplied by the maximum applicable F_{en} for the material, from NUREG/CR-6583 for carbon and low-alloy steels. These locations require no further analysis.

Removing Conservatism

If the EAF CUF is above 1.0, then NUREG/CR-6260 advises that conservative assumptions could be removed to reduce the CUF and F_{en} values. The remaining NUREG/CR-6260 locations have been evaluated using NB-3200 methods to reduce the EAF CUF values. The methods used to reduce the EAF CUF values include (1) recalculating the CUF with a more accurate fatigue analysis; (2) using projected values of the accumulated number of transient events, instead of using the 40-year number of events (see Table 4.3-2 for projected transient cycles); and (3) calculating an average F_{en}; using strain-rate dependent F_{en} values for load set pairs significant to fatigue and using the maximum F_{en} for load set pairs not-significant to fatigue.

The removal of conservatisms resulted in the accumulator safety injection nozzle and RHR inlet nozzle 60-year EAF CUFs reducing to below 1.0. The level of dissolved oxygen was assumed to be less than 0.05 ppm, which corresponds to a low oxygen environment. This is conservative as it will always result in a larger F_{en} for stainless steel.

Despite efforts to reduce the EAF CUFs below 1.0, the EAF CUFs for the hot leg surge nozzle and charging nozzles are projected to exceed 1.0 within 60 years of operation. Corrective action for these locations will be required under the Metal Fatigue of Reactor Pressure Boundary program (B3.1) when the cycle-based fatigue (CBF) results, including the effects of the reactor coolant environment, indicate that a fatigue based action limit has been reached. These corrective actions include revising the fatigue analysis, repairing or replacing these nozzles, or augmenting the inservice inspection program to require ASME Section XI volumetric examination at regular intervals.

Table 4.3-8 Summary of Fatigue Usage Factors at NUREG/CR-6260 Sample Locations Adapted to STP Units 1 and 2

Location	Material	40-Year CUF	F_{en}	40-Year EAF CUF	60-Year EAF CUF[1]
1. RPV Wall Transition[2]	Low Alloy Steel	0.0062	2.455	0.015	0.0225
2. RPV Inlet Nozzle	Low Alloy Steel	0.0342	2.455	0.084	0.126
3. RPV Outlet Nozzle	Low Alloy Steel	0.0167	2.455	0.041	0.0615
4. Hot Leg Surge Nozzle (Safe End)	Stainless Steel	0.8196	9.26	7.5904	11.3856
5. Charging System Nozzle (Normal Line)	Stainless Steel	0.19814	7.866	1.5585	2.3378
6. Charging System Nozzle (Alternate Line)	Stainless Steel	0.19814	7.866	1.5585	2.3378
7. Accumulator Safety Injection Nozzle (Loop 1)	Stainless Steel	0.0769	7.21	0.553	0.830
8. Accumulator Safety Injection Nozzle (Loop 2)	Stainless Steel	0.0769	7.21	0.553	0.830
9. Accumulator Safety Injection Nozzle (Loop 3)	Stainless Steel	0.0769	7.21	0.553	0.830
10. RHR Inlet Nozzle	Stainless Steel	0.0042	15.35	0.064	0.096

1 60-Year EAF CUF is equal to the Design EAF CUF multiplied by 1.5.
2 The RPV Wall Transition location has a larger design CUF than the RPV Bottom Head-to-Shell Juncture location designated in NUREG/CR-6260. Therefore, the RPV Wall Transition location is monitored as the bounding location.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

All of the locations specified in NUREG/CR-6260 for newer-vintage Westinghouse plants are monitored by the Metal Fatigue of Reactor Pressure Boundary program described in Section 4.3.1 and B3.1. The program ensures that the fatigue usage factors, including the effects of the reactor coolant environment, remain within the code limit of 1.0 for the period of extended operation; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of the reactor coolant environment on fatigue usage factors in the NUREG/CR-6260 locations will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.5 Assumed Thermal Cycle Count for Allowable Secondary Stress Range Reduction Factor in ANSI B31.1 and ASME Section III Class 2 and 3 Piping

Summary Description

Piping in the scope of license renewal that is designed to ANSI B31.1 or ASME Section III Class 2 and 3 requires the application of a stress range reduction factor to the allowable stress range (expansion and displacement) to account for thermal cyclic conditions. If the number of equivalent full temperature cycles exceeds 7,000, a factor less than 1 must be used. These piping analyses are TLAAs because they are part of the current licensing basis, are used to support safety determinations, and depend on an assumed number of thermal cycles that can be linked to plant life.

Analysis

STP ASME Section III Class 2 and 3 piping is designed to the 1974 Edition, including Winter 1975 addenda; plus later editions and addenda for certain requirements. STP ANSI B31.1 piping is designed to the 1973 Edition, including Winter 1975 addenda, plus paragraphs from later editions for certain requirements. A review of ASME Section III Class 2 and 3 and B31.1 piping specifications found no indication of a number of expected lifetime full-range or equivalent full-range thermal cycles greater than 7,000 during the original 40-year plant life.

Temperature screening criteria were used to identify components that might be subject to significant thermal fatigue effects. Normal and upset operating temperatures less than 220°F in carbon steel components, or 270°F in stainless steel, will not produce significant thermal stresses, and will not therefore produce significant fatigue effects. However, configurations subject to high stress intensification factors or component specific residual stresses may require further evaluation.

Survey Results

A systematic survey of all plant piping systems found that the piping and components in the scope of license renewal:

1. Do not meet the operating temperature screening criteria, and therefore do not experience significant thermal cycle stresses; or

2. Clearly do not operate in a cycling mode that would expose the piping to more than three thermal cycles per week, i.e. to more than 7,000 cycles in 60 years; or

3. The assumed thermal cycle count for the analyses depends closely on reactor operating cycles, and can therefore conservatively be approximated by the thermal cycles used in the ASME Section III Class 1 vessel and piping fatigue analyses.

For this last case, thermal cycles likely to produce full-range thermal cycles in balance-of-plant Class 2, 3, and B31.1 piping, in a 40-year plant lifetime, are the 200 heatup-cooldown cycles and 400 reactor trips.

Other events may contribute a few full-range or a number of part-range cycles. However, the total count of design basis events significant to fatigue is only about 3,500. The total number of these actually expected in a 60-year life is about 1,040. See Table 4.3-2. The total count of expected full-range thermal cycles for most of these systems is less than 1,500 for a 60-year plant life, which is a fraction of the 7,000 cycle threshold for which a stress range reduction factor is required in the applicable piping codes.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The expected number of equivalent full-range thermal cycles for piping is less than 2,000 in 60 years, which is only a fraction of the 7,000-cycle threshold for which a stress range reduction factor is required in the applicable piping codes. Therefore the existing analyses of piping for which the allowable range of secondary stresses depends on the number of assumed thermal cycles and that are within the scope of license renewal are valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

4.3.6 ASME Section III Fatigue Analysis of Metal Bellows and Expansion Joints

Summary Description

NUREG-1800, *The Standard Review Plan for License Renewal*, discusses fatigue analysis review requirements for metal bellows. A search of the STP CLB discovered design requirements of the fuel transfer tube penetration bellows and diesel generator cooling water bellows.

The fuel transfer tube penetration bellows TLAA is discussed in Section 4.6.2 of this chapter.

Analysis

STP UFSAR Section 9.5.5, *Diesel Generator Cooling Water System* identifies the design of the diesel generator cooling water bellows as ASME Section III, Class 3. The STP metal expansion joints design specification requires that these expansion joints be designed in accordance with Section ND of the ASME Section III 1977 Code, including Summer 1977 addenda; and have a minimum design life of 40 years.

The fatigue analyses for the metal expansion joints verify the 40 year design requirement for the diesel generator cooling water expansion joints by satisfying ASME Section III, Subsection ND-3649.4(d), which limits the component's lifetime cyclical loading.

Disposition: Validation, 10 CFR 54.21(c)(1)(i) and Aging Management, 10 CFR 54.21(c)(1)(iii)

Validation, 10 CFR 54.21(c)(1)(i)

The analyzed numbers of cycles for all but seven of the diesel generator cooling water expansion joints are greater than the specified numbers of cycles extrapolated to 60 years. Therefore the analyses are valid for these bellows through the period of extended operation. These diesel generator cooling water expansion joint TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Aging Management, 10 CFR 54.21(c)(1)(iii)

STP has committed to replace, prior to the period of extended operation, the seven diesel generator cooling water expansion joints that are projected to exceed the analyzed number of cycles during the period of extended operation. The analyses for the replacement expansion joints will include the period of extended operation. Therefore these seven diesel generator cooling water expansion joint TLAAs will be dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.4 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRIC EQUIPMENT

10 CFR 50.49, *Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants*, requires that certain electrical and instrument and control (I&C) equipment, important to safety, located in harsh environments, be qualified to perform their safety-related functions in those harsh environments after the effects of in-service aging.

The Environmental Qualification program includes qualification of some components for the licensed operating period. Since the scope of the Environmental Qualification program is generally limited to safety-related or quality augmented components with safety functions or that support safety functions, and since these qualifications support safety determinations, Environmental Qualification program qualifications for the plant design lifetime are time-limited aging analyses (TLAAs). A more detailed screening of each component would require examination of the individual component qualifications, and is not required for the license renewal application (LRA). The Environmental Qualification program requires that the component qualifications be examined prior to expiration of the qualified life of each component, and that each affected component be requalified, refurbished, or replaced as required.

Aging evaluations that qualify components to at least the end of the current licensed operating period are TLAAs. The STP Environmental Qualification program is described in UFSAR Sections 3.11 and 3.11N.

Summary Description

10 CFR 50.49 defines the scope of components to be included, and requires the preparation and maintenance of documentation that includes component performance specifications, electrical characteristics, and environmental conditions. Compliance with 10 CFR 50.49 provides evidence that the component will perform its intended functions during and after a design basis accident after experiencing the effects of in-service aging.

10 CFR 50.49(c) explicitly excludes requirements for (1) dynamic and seismic qualifications, (2) protection against other natural phenomena and external events, and (3) environmental qualification of equipment located in a mild environment. 10 CFR 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. 10 CFR 50.49(e)(5) also requires component replacement or maintenance prior to the end of designated life, unless additional life is established through ongoing qualification.

NUREG-0588, *Interim Staff Position on Environmental Qualification of Safety Related Electrical Equipment,* invoked Category I, IEEE Standard 323-1974, *IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations,* requirements for plants whose construction permit Safety Evaluation Reports were dated July 1, 1974, or after; and Category II, IEEE Standard 323-1971 requirements for plants whose construction permit Safety Evaluation Reports were dated before July 1, 1974. The construction permits of both South Texas Units 1 and 2 are dated 1975, and the SER issue date is April, 1986. STP is therefore a NUREG-0588 Category I plant, but the NRC evaluated STP electrical equipment qualification based on Regulatory Guide 1.89, *Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants,* Revision 0.

STP Program Description

Regulatory Commitments

STP is committed to conform to the intent of Regulatory Guide 1.89, Revision 0. STP is not committed to Regulatory Guide 1.89, Revision 1; however STP utilizes Revision 1 for guidance in the interpretation of NRC requirements. STP is committed to conform to the intent of Regulatory Guide 1.97, *Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident,* Revision 2. In addressing conformance with Regulatory Guide 1.97, the applicant has identified a number of alternative methods of meeting the intent of Regulatory Guide 1.97. The staff reviewed the alternative methods and found them acceptable.

The STP Environmental Qualification program is consistent with the guidance of NUREG-0588, Category I, and the requirements of 10 CFR 50.49, with exemption from the environmental qualification scope for certain low-safety/risk significant (LSS) and non-risk significant (NRS) components. These components remain within the scope of equipment qualification. The NRC acceptance of the Unit 1 and 2 Environmental Qualification programs are documented in supplements to the STP Safety Evaluation Report (SSER), Nos. 4, and 6, respectively.

Program Overview

The scope of equipment requiring qualification are those which automatically perform, are used by operator action to perform, or whose failure could prevent the performance of: (1) emergency reactor shutdown, (2) containment isolation, (3) reactor core cooling, (4) containment and reactor heat removal, (5) prevent a significant release of radioactivity to the environment, and (6) certain post accident monitoring equipment.

The STP Environmental Qualification program outlines the methodology for performing activities required to establish, maintain, and document the environmental qualification of electrical equipment important to safety. The current list of equipment requiring environmental qualification is maintained in accordance with plant procedures and the Equipment Qualification Database.

Analysis

Safety-related electrical equipment and components located in a harsh environment are qualified by test or combination of test and analysis in accordance with the requirements of 10 CFR 50.49 and NUREG-0588, Revision 1. Detailed qualification results for electrical equipment located in a harsh environment are maintained in the station files.

Thermal, radiation, and wear cycle aging analyses that qualify components to at least the end of the current licensed operating period are TLAAs. Aging evaluations that qualify components for shorter periods, and therefore require refurbishment or replacement, are not TLAAs.

The Environmental Qualification program manages applicable component thermal, radiation, and cyclic aging effects through the aging evaluations for the current operating license using methods of demonstrating qualification for aging and accident conditions established by 10 CFR 50.49(f). Under 10 CFR 54.21(c)(1)(iii), the plant Environmental Qualification program, which implements the requirements of 10 CFR 50.49 (as further defined and clarified by NUREG-0588 and Regulatory Guide 1.89, Revision 1), is an Aging Management Program (AMP) for license renewal. Maintaining qualification through the period of extended operation requires that existing Equipment Qualification Checklist Packages (EQCPs) be reevaluated. Re-analysis of an aging evaluation to extend the qualification of components is performed on a routine basis as part of the Environmental Qualification program. The important attributes of reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met), as discussed below.

<u>Analytical Methods:</u> The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable model for a thermal aging evaluation. For license renewal radiation aging evaluation, 60-year normal radiation dose is established by extrapolating the 40-year normal dose (40-year dose times 1.5) plus accident radiation dose. 60-year cyclical aging is established in a similar manner. Other models may be justified on a case-by-case basis.

<u>Data Collection and Reduction Methods:</u> Reducing excess conservatism in the component service conditions (for example, temperature, radiation, and cycles) used in the prior aging evaluation is the chief method used for a reanalysis. Actual monitored service conditions such as temperature are generally lower than the design service conditions used in the prior aging evaluation and therefore can support extended thermal life of the equipment.

<u>Underlying Assumptions</u>: Environmental qualification component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected environmental qualification component is evaluated and

appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Excess conservatism in thermal life analysis may be reduced by reevaluating material activation energy, to justify a higher value that would support extended life at elevated temperature. Similar methods of reducing excess conservatism in the component service conditions and material properties used in prior aging evaluations may be used for radiation and cyclical aging. Any changes to material activation energy will be justified.

Acceptance Criteria and Corrective Actions: If qualification cannot be extended by reanalysis, the component is refurbished or replaced prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace or re-qualify the component if reanalysis is unsuccessful).

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The Environmental Qualification (EQ) of Electric Equipment program described in B3.2 ensures that the aging effects are managed and that the environmental qualification components continue to perform their intended functions for the period of extended operation. Aging effects addressed by the Environmental Qualification program will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.5 CONCRETE CONTAINMENT TENDON PRESTRESS ANALYSIS

Summary Description

The STP containments are prestressed concrete, hemispherical dome-on-a-cylinder structures with a steel membrane liner and a flat basemat. Post-tensioned tendons compress the concrete and permit the structures to withstand design basis accident internal pressures.

The original design predictions and the regression analyses of surveillance data that predict the future performance of the post-tensioning system to the end of design life are TLAAs. The tendon surveillance program must ensure that tendons continue to maintain adequate prestress for the period of extended operation.

This program periodically measures the prestress load on a defined sample of tendons; and examines the condition of tendons and supporting structures, materials, and components. From the data, the program periodically reconfirms that the expected tendon prestress loads will remain within design limits to at least the next inspection or if the relaxation is not acceptable, prescribes retensioning or other corrective measures to ensure that at no time will the average prestress in a tendon group fall below the minimum required prestress.

The STP post-tensioning system consists of two tendon groups in each unit:

- 96 vertical, inverted-U-shaped tendons, extending up through the basemat, through the full height of the cylindrical walls and over the dome.
- 133 horizontal circumferential (hoop) tendons at intervals from the basemat to about the 45-degree elevation of the dome.

The vertical inverted-U tendons are anchored through the bottom of the basemat. The horizontal hoop tendons are anchored at three exterior buttresses, 120 degrees apart. Each tendon consists of up to 186, ¼ inch high-strength steel wires, with cold-formed button heads on each end bearing on stressing washers. The total tendon load is then carried by a shim stack to steel bearing plates embedded in the structure.

Analysis

Tendon Surveillance Program

The tendon surveillance program is described in B3.3, Concrete Containment Tendon Prestress program. In accordance with 10 CFR 50.55a(g)(4)(ii), the third interval inservice inspection program for Subsection IWL will be conducted in accordance with the requirements of the 2004 Edition no addenda of ASME Section XI.

The design acceptance criterion is that the measured losses must come close enough to predicted values to provide high confidence that the design value for minimum prestress force will be exceeded throughout the life of the plant. The design acceptance criterion is ensured by surveillance program acceptance criteria that are consistent with ASME XI Subsection IWL-3221.1.

The program specifies sample size, randomly selects tendons for testing, and if the relaxation is not acceptable, prescribes retensioning or other corrective measures to ensure that at no time will the average prestress in a tendon group fall below their minimum required prestress. In accordance with Regulatory Guide 1.35, *Inspection of Ungrouted Tendons in Prestressed Concrete Containments*, April 1979, proposed Revision 3, the examination frequency for Unit 1 is 1, 5, and 10 years after its initial Structural Integrity Test (SIT) and every 10 years thereafter; and the examination frequency for Unit 2 is 1, 5, and 15 years after its initial SIT and every 10 years thereafter. Beginning year 15, the tendon surveillance program complies with ASME XI Subsection IWL. The initial SIT for Unit 1 was completed in March 1987. The initial SIT for Unit 2 was completed in September 1988.

The program inspects a random sample of tendons from each group (vertical and hoop) in each inspection interval to confirm that acceptance criteria are met, and therefore that tendon prestresses remain above minimum required values (MRVs, or minimum required prestress in ASME XI Subsection IWL-3221.1) for the succeeding inspection interval. At each inspection the program also recalculates the regression analysis trend lines of these two groups, based on individual tendon forces, to confirm whether average prestresses will remain above their MRVs for the remainder of the licensed operating period.

The program performs a separate regression analysis of each of the horizontal and vertical tendon groups of each unit.

Tendon Group Lift-off Forces and Limits (Acceptance Criteria)

The program specification incorporates the ASME XI Subsection IWL-3221.1 acceptance criteria:

(a) The average of all measured tendon forces for each type of tendon is equal to or greater than the minimum required prestress specified at the anchorage for that type of tendon.

<u>Minimum Lift-off Force:</u>

Inverted U-Tendon	1150 kips
Hoop Cylinder	1169 kips
Hoop Dome	1123 kips

(b) The measured force in each individual tendon is not less than 95 percent of the predicted force unless the following conditions are satisfied:

(1) The measured force in not more than one tendon is between 90 percent and 95 percent of the predicted force;

(2) The measured force in two tendons located adjacent to the tendon in (b)(1) above are not less than 95 percent of the predicted forces; and

(3) The measured forces in all the remaining sample tendons are not less than 95 percent of the predicted force.

(c) The prestressing forces for each type of tendon measured and the measurement from the previous examination, indicate a prestress loss such that predicted tendon forces meet the minimum design prestress forces at the next scheduled examination.

When evaluation of consecutive surveillances of prestressing forces for the same tendon or tendons in a group indicates a trend of prestress loss such that the tendon force(s) would be less than the minimum design prestress requirements before the next inspection interval, an evaluation shall be performed and reported in an Engineering Evaluation Report.

(d) The measured tendon elongation varies from the last measurement, adjusted for effective wires or strands, by less than 10 percent.

When elongation corresponding to a specific load differs by more than 10 percent from that recorded during the installation, an engineering evaluation must be performed to determine whether the difference is related to wire failures or slip of wires in anchorages.

Additional criteria specified in the program apply to wire and concrete condition and are consistent with ASME XI Subsection IWL-3221.1.

Surveillance Program Predicted Loss of Prestress

The surveillance calculation estimates the 40-year loss and lists the predicted and measured lift-off forces in individual tendons selected for surveillance. Predicted tendon lift-off values are calculated for each individual tendon selected.

The measured force trend lines, when projected past 60 years, remain above the minimum required design prestress values. See Figure 4.5-1, Figure 4.5-2, Figure 4.5-3, and Figure 4.5-4.

Consistency with Regulatory Guidance

Regression Analysis Trend Lines: The program calculates current trend values for each tendon on an individual basis by regression of the full set of individual tendon lift-off data for each tendon group. These analyses are revised following each tendon surveillance. The surveillance data trend line regression analyses are consistent with the methodology presented in NRC Information Notice 99-10, *Degradation of Prestressing Tendon Systems in Prestressed Concrete Containments*, Attachment 3.

Minimum Required Values and Predicted Values: The tendon minimum required design prestresses are parameters of the original design. The surveillance program predicted force lines were developed from the loss of prestress model used during the original design. The calculations of predicted force are consistent with NRC Regulatory Guide 1.35.1, *Determining Prestressing Forces for Inspection of Prestressed Concrete Containments*. The current tendon surveillance program uses ASME XI subsection IWL acceptance criteria of 95 percent of the predicted force. This action limit is used in lieu of the RG 1.35.1 lower bound.

Surveillance Results

To date, 140 liftoff tests have been conducted. All but two of these were acceptable (>95 percent of predicted force). The other two occurred in year 1 (Unit 2) and year 5 (Unit 1), both at 94 percent of predicted force. In years 10, 15, and 20 all tested tendons were found to be above the acceptance limit. Thus, nothing has been observed that is indicative of unanticipated rates of degradation.

The most recent regression analysis is included in the 2009, 20-year tendon surveillance report. It found (1) the recent surveillance data for individual tendons have all fallen above the first action limit at 95 percent of the predicted force line; and (2) the regression analysis of surveillance lift-off data has extended the trend lines for both the vertical and horizontal tendons of each unit to 100 years. A comparison of these regression curves with their respective MRVs and predicted prestress force lines confirms that the average prestress forces will remain above their MRVs and meet the requirements of 10 CFR 50.55a(b)(2)(viii)(B).

The lift-off trend lines calculated by regression of surveillance data to date indicate that average group lift-offs remain well above their MRVs for at least 100 years for each unit. Extending the existing trend lines to 100 years, the worst case group (Unit 1 horizontals) will be more than 9% above MRV at the end of the period of extended operation.

Table 4.5-1, Figure 4.5-1, Figure 4.5-2, Figure 4.5-3, and Figure 4.5-4 summarize input data of the most recent regression analyses. Dome and Cylinder hoop tendons are trended as a single group and conservatively compared to the higher of the two MRVs. In the table, common tendons (those surveyed at each inspection) are marked in boldface.

The lift-off trend lines are calculated by regression of individual tendon lift-off data, including results of the most recent 2009, 20-year surveillance. These calculations are therefore consistent with NRC Information Notice 99-10, Attachment 3.

The predicted values for each tendon are compared to the measured values at each inspection. The surveillance program extends the predicted force lines for each tendon through the period of extended operation and the regression analysis has extended the trend lines for both vertical and horizontal tendons of each unit to 100-years.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

The recent surveillance data for individual tendons have all fallen above the first action limit at 95 percent of the predicted force line; and the regression analysis of surveillance lift-off data has extended the trend lines for both the vertical and horizontal tendons to 100 years. Both trend lines remain well above their minimum required values for the period of extended operation.

The Concrete Containment Tendon Prestress program described in B3.3 continues to manage loss of tendon prestress for the period of extended operation by confirming that the average lift-off forces of both tendon groups remain above their minimum required values (MRVs), as required by the design basis of the containment building and of its post-tensioning system. Therefore tendon prestress will be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
Inverted-U Vertical Tendons Unit 1							
1	**1**	**V126**	**Shop**	**1402**	**06/01/1988**	**7/21/1986**	**1.860**
1	**1**	**V126**	**Field**	**1439**	**06/01/1988**	**7/21/1986**	**1.860**
1	1	V144	Shop	1400	06/01/1988	7/21/1986	1.860
1	1	V144	Field	1343	06/01/1988	7/21/1986	1.860
1	1	V227	Shop	1336	06/01/1988	7/21/1986	1.860
1	1	V227	Field	1325	06/01/1988	7/21/1986	1.860
1	1	V245	Shop	1363	06/01/1988	7/21/1986	1.860

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
1	1	V245	Field	1326	06/01/1988	7/21/1986	1.860
1	**5**	**V126**	**Shop**	**1385**	**05/01/1993**	**7/21/1986**	**6.780**
1	**5**	**V126**	**Field**	**1406**	**05/01/1993**	**7/21/1986**	**6.780**
1	5	V214	Shop	1380	05/01/1993	7/21/1986	6.780
1	5	V214	Field	1392	05/01/1993	7/21/1986	6.780
1	5	V242	Shop	1381	05/01/1993	7/21/1986	6.778
1	5	V242	Field	1397	05/01/1993	7/21/1986	6.778
1	5	V248	Shop	1359	05/01/1993	7/21/1986	6.778
1	5	V248	Field	1382	05/01/1993	7/21/1986	6.778
1	10	V129	Shop	1290	11/01/1998	7/21/1986	12.278
1	10	V129	Field	1320	11/01/1998	7/21/1986	12.278
1	10	V230	Shop	1380	11/01/1998	7/21/1986	12.278
1	10	V230	Field	1430	11/01/1998	7/21/1986	12.278
1	**10**	**V126**	**Shop**	**1340**	**11/01/1998**	**7/21/1986**	**12.278**
1	**10**	**V126**	**Field**	**1380**	**11/01/1998**	**7/21/1986**	**12.278**
1	20	V111	Shop	1334.1	01/05/2009	7/21/1986	22.456
1	20	V111	Field	1313.44	01/05/2009	7/21/1986	22.456
1	**20**	**V126**	**Shop**	**1363.16**	**12/11/2008**	**7/21/1986**	**22.389**
1	**20**	**V126**	**Field**	**1389**	**12/12/2008**	**7/21/1986**	**22.392**
1	20	V133	Shop	1356.45	12/11/2008	7/21/1986	22.389
1	20	V133	Field	1322.2	12/12/2008	7/21/1986	22.392
Horizontal Cylinder Wall (Hoop) Tendons Unit 1							
1	**1**	**1H091**	**Shop**	**1380**	**06/01/1988**	**7/21/1986**	**1.861**

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
1	**1**	**1H091**	**Field**	**1378**	**06/01/1988**	**7/21/1986**	**1.861**
1	1	1H106	Shop	1345	06/01/1988	7/21/1986	1.861
1	1	1H106	Field	1354	06/01/1988	7/21/1986	1.861
1	1	2H051	Shop	1297	06/01/1988	7/21/1986	1.861
1	1	2H051	Field	1321	06/01/1988	7/21/1986	1.861
1	1	2H054	Shop	1376	06/01/1988	7/21/1986	1.861
1	1	2H054	Field	1363	06/01/1988	7/21/1986	1.861
1	1	2H078	Shop	1423	06/01/1988	7/21/1986	1.861
1	1	2H078	Field	1373	06/01/1988	7/21/1986	1.861
1	1	3H005	Shop	1402	06/01/1988	7/21/1986	1.861
1	1	3H005	Field	1356	06/01/1988	7/21/1986	1.861
1	1	3H032	Shop	1345	06/01/1988	7/21/1986	1.861
1	1	3H032	Field	1365	06/01/1988	7/21/1986	1.861
1	**5**	**1H091**	**Shop**	**1312**	**05/01/1993**	**7/21/1986**	**6.778**
1	**5**	**1H091**	**Field**	**1329**	**05/01/1993**	**7/21/1986**	**6.778**
1	5	2H093	Shop	1276	05/01/1993	7/21/1986	6.778
1	5	2H093	Field	1270	05/01/1993	7/21/1986	6.778
1	5	2H036	Shop	1384	05/01/1993	7/21/1986	6.778
1	5	2H036	Field	1381	05/01/1993	7/21/1986	6.778
1	5	2H048	Shop	1380	05/01/1993	7/21/1986	6.778
1	5	2H048	Field	1338	05/01/1993	7/21/1986	6.778
1	10	1H043	Shop	1330	11/01/1998	7/21/1986	12.278
1	10	1H043	Field	1320	11/01/1998	7/21/1986	12.278

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
1	10	1H049	Shop	1270	11/01/1998	7/21/1986	12.278
1	10	1H049	Field	1330	11/01/1998	7/21/1986	12.278
1	**10**	**1H091**	**Shop**	**1310**	**11/01/1998**	**7/21/1986**	**12.278**
1	**10**	**1H091**	**Field**	**1280**	**11/01/1998**	**7/21/1986**	**12.278**
1	20	1H031	Shop	1355.87	12/17/2008	7/21/1986	22.406
1	20	1H031	Field	1378.75	12/18/2008	7/21/1986	22.408
1	**20**	**1H091**	**Shop**	**1300.81**	**12/16/2008**	**7/21/1986**	**22.403**
1	**20**	**1H091**	**Field**	**1300.07**	**12/17/2008**	**7/21/1986**	**22.406**
1	20	2H063	Shop	1299.34	12/15/2008	7/21/1986	22.400
1	20	2H063	Field	1280.85	12/15/2008	7/21/1986	22.400
Horizontal Dome (Hoop) Tendons Unit 1							
1	1	1H130	Shop	1383	06/01/1988	7/21/1986	1.861
1	1	1H130	Field	1360	06/01/1988	7/21/1986	1.861
1	1	2H111	Shop	1386	06/01/1988	7/21/1986	1.861
1	1	2H111	Field	1336	06/01/1988	7/21/1986	1.861
1	5	1H112	Shop	1281	05/01/1993	7/21/1986	6.778
1	5	1H112	Field	1270	05/01/1993	7/21/1986	6.778
1	5	2H129	Shop	1345	05/01/1993	7/21/1986	6.778
1	5	2H129	Field	1213	05/01/1993	7/21/1986	6.778
1	10	1H127	Shop	1340	11/01/1998	7/21/1986	12.278
1	10	1H127	Field	1310	11/01/1998	7/21/1986	12.278
1	10	1H130	Shop	1330	11/01/1998	7/21/1986	12.278
1	10	1H130	Field	1290	11/01/1998	7/21/1986	12.278

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
1	10	2H129	Shop	1320	11/01/1998	7/21/1986	12.278
1	10	2H129	Field	1265	11/01/1998	7/21/1986	12.278
Inverted-U Vertical Tendons Unit 2							
2	**1**	**V110**	**Shop**	**1421**	**2/1/1990**	**05/31/88**	**1.669**
2	**1**	**V110**	**Field**	**1377**	**2/1/1990**	**05/31/88**	**1.669**
2	1	V120	Shop	1403	2/1/1990	05/31/88	1.669
2	1	V120	Field	1400	2/1/1990	05/31/88	1.669
2	1	V202	Shop	1432	2/1/1990	05/31/88	1.669
2	1	V202	Field	1422	2/1/1990	05/31/88	1.669
2	1	V236	Shop	1382	2/1/1990	05/31/88	1.669
2	1	V236	Field	1370	2/1/1990	05/31/88	1.669
2	**5**	**V110**	**Shop**	**1412**	**10/1/1993**	**05/31/88**	**5.336**
2	**5**	**V110**	**Field**	**1362**	**10/1/1993**	**05/31/88**	**5.336**
2	5	V203	Shop	1415	10/1/1993	05/31/88	5.336
2	5	V203	Field	1407	10/1/1993	05/31/88	5.336
2	5	V221	Shop	1479	10/1/1993	05/31/88	5.336
2	5	V221	Field	1452	10/1/1993	05/31/88	5.336
2	5	V233	Shop	1348	10/1/1993	05/31/88	5.336
2	5	V233	Field	1338	10/1/1993	05/31/88	5.336
2	**15**	**V110**	**Shop**	**1387**	**12/03/03**	**05/31/88**	**15.508**
2	**15**	**V110**	**Field**	**1354**	**12/03/03**	**05/31/88**	**15.508**
2	15	V148	Shop	1374	12/10/03	05/31/88	15.528
2	15	V148	Field	1375	12/09/03	05/31/88	15.525

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
2	15	V240	Shop	1375	12/02/03	05/31/88	15.506
2	15	V240	Field	1380	12/02/03	05/31/88	15.506
Horizontal Cylinder Wall (Hoop) Tendons Unit 2							
2	1	1H094	Shop	1283	2/1/1990	05/31/88	1.669
2	1	1H094	Field	1335	2/1/1990	05/31/88	1.669
2	1	2H033	Shop	1216	2/1/1990	05/31/88	1.669
2	1	2H033	Field	1354	2/1/1990	05/31/88	1.669
2	**1**	**2H075**	**Shop**	**1394**	**2/1/1990**	**05/31/88**	**1.669**
2	**1**	**2H075**	**Field**	**1398**	**2/1/1990**	**05/31/88**	**1.669**
2	1	2H105	Shop	1418	2/1/1990	05/31/88	1.669
2	1	2H105	Field	1400	2/1/1990	05/31/88	1.669
2	1	3H005	Shop	1355	2/1/1990	05/31/88	1.669
2	1	3H005	Field	1375	2/1/1990	05/31/88	1.669
2	1	3H029	Shop	1392	2/1/1990	05/31/88	1.669
2	1	3H029	Field	1319	2/1/1990	05/31/88	1.669
2	1	3H056	Shop	1361	2/1/1990	05/31/88	1.669
2	1	3H056	Field	1346	2/1/1990	05/31/88	1.669
2	5	1H055	Shop	1325	10/1/1993	05/31/88	5.336
2	5	1H055	Field	1298	10/1/1993	05/31/88	5.336
2	5	1H106	Shop	1308	10/1/1993	05/31/88	5.336
2	5	1H106	Field	1251	10/1/1993	05/31/88	5.336
2	5	2H018	Shop	1421	10/1/1993	05/31/88	5.336
2	5	2H018	Field	1352	10/1/1993	05/31/88	5.336

Table 4.5-1 Tendon Regression Analysis Input Data for STP Units 1 and 2

Unit	Year	Tendon	End	Force, Kips	Date	Tension Date	Time at Tension (Years)
2	5	2H045	Shop	1356	10/1/1993	05/31/88	5.336
2	5	2H045	Field	1300	10/1/1993	05/31/88	5.336
2	**5**	**2H075**	**Shop**	**1324**	**10/1/1993**	**05/31/88**	**5.336**
2	**5**	**2H075**	**Field**	**1338**	**10/1/1993**	**05/31/88**	**5.336**
2	5	3H050	Shop	1336	10/1/1993	05/31/88	5.336
2	5	3H050	Field	1323	10/1/1993	05/31/88	5.336
2	10	2H030	Shop	1280	11/1/1998	05/31/88	10.419
2	10	2H030	Field	1320	11/1/1998	05/31/88	10.419
2	10	2H033	Shop	1196	11/1/1998	05/31/88	10.419
2	10	2H033	Field	1280	11/1/1998	05/31/88	10.419
2	10	2H036	Shop	1290	11/1/1998	05/31/88	10.419
2	10	2H036	Field	1310	11/1/1998	05/31/88	10.419
2	**15**	**2H075**	**Shop**	**1312**	**11/13/03**	**05/31/88**	**15.453**
2	**15**	**2H075**	**Field**	**1343**	**11/13/03**	**05/31/88**	**15.453**
2	15	2H078	Shop	1295	11/18/03	05/31/88	15.467
2	15	2H078	Field	1308	11/18/03	05/31/88	15.467
2	15	3H008	Shop	1304	12/18/03	05/31/88	15.550
2	15	3H008	Field	1330	12/18/03	05/31/88	15.550
Horizontal Dome (Hoop) Tendons Unit 2							
2	1	1H112	Shop	1274	2/1/1990	05/31/88	1.669
2	1	1H112	Field	1303	2/1/1990	05/31/88	1.669
2	1	1H124	Shop	1312	2/1/1990	05/31/88	1.669
2	1	1H124	Field	1337	2/1/1990	05/31/88	1.669

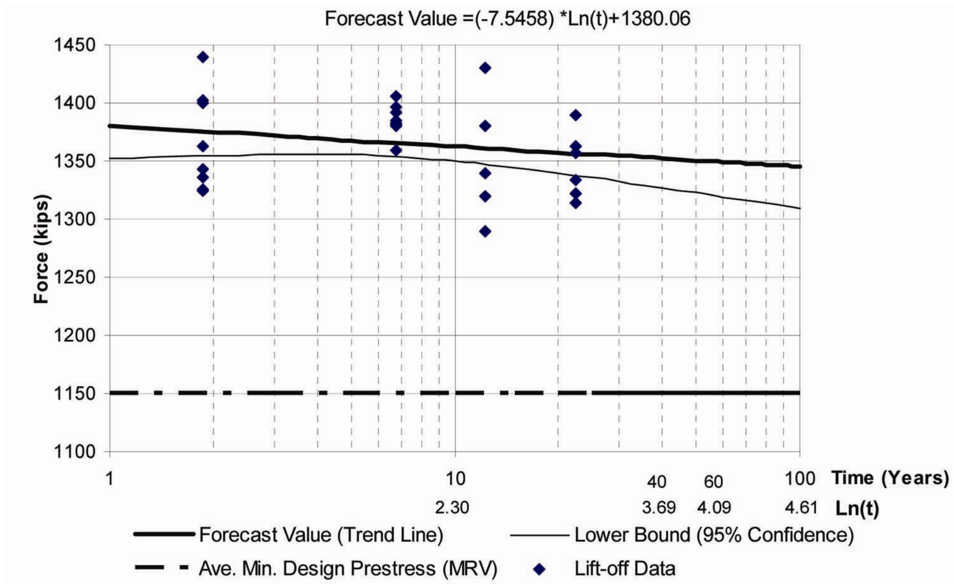

Figure 4.5-1 - Regression Analysis of Unit 1 Vertical Tendon Lift-off Data through the 20-Year Surveillance

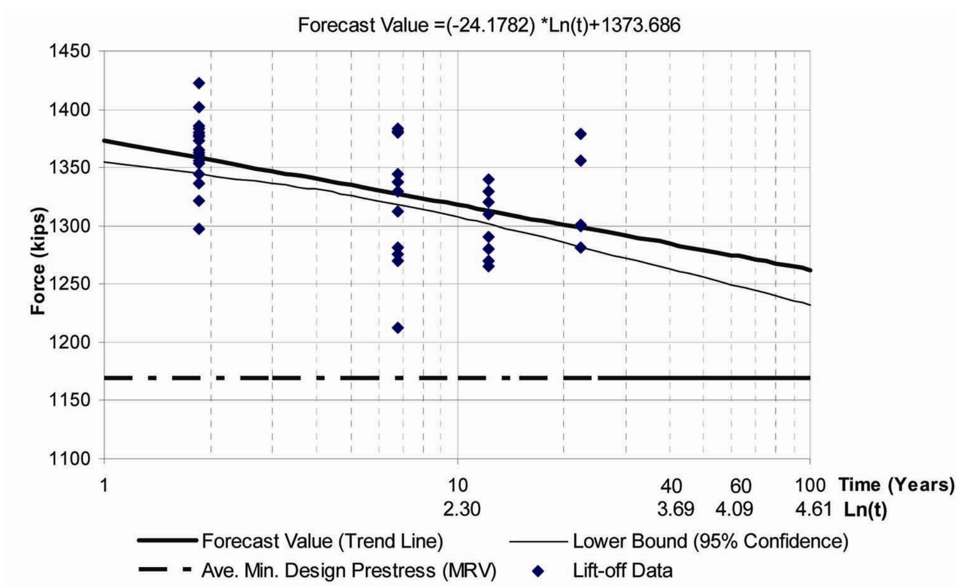

Figure 4.5-2 - Regression Analysis of Unit 1 Horizontal (Hoop) Tendon Lift-off Data through the 20-Year Surveillance

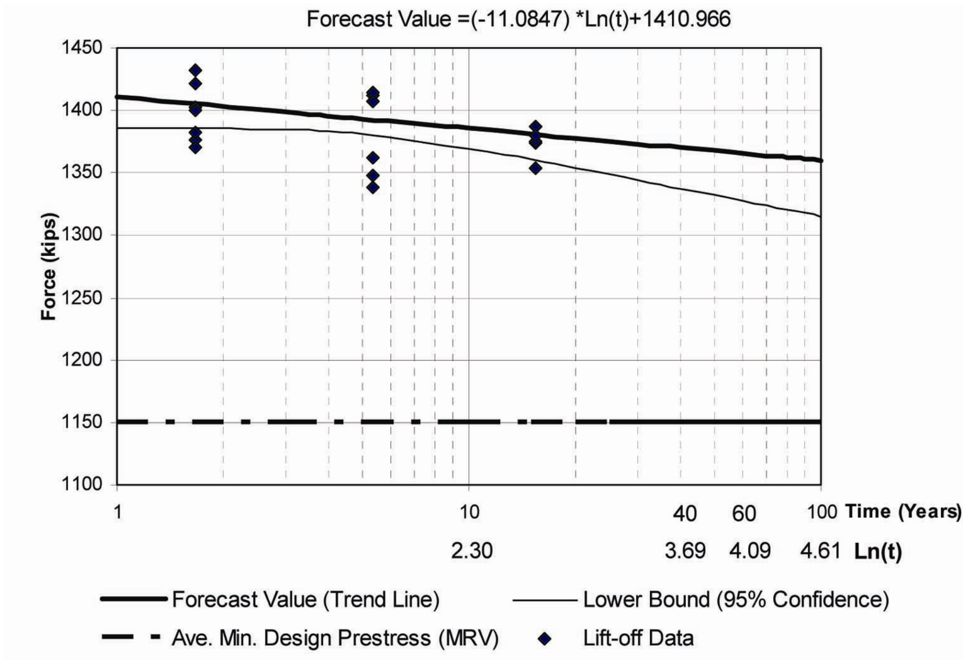

Figure 4.5-3 - Regression Analysis of Unit 2 Vertical Tendon Lift-off Data through the 20-Year Surveillance

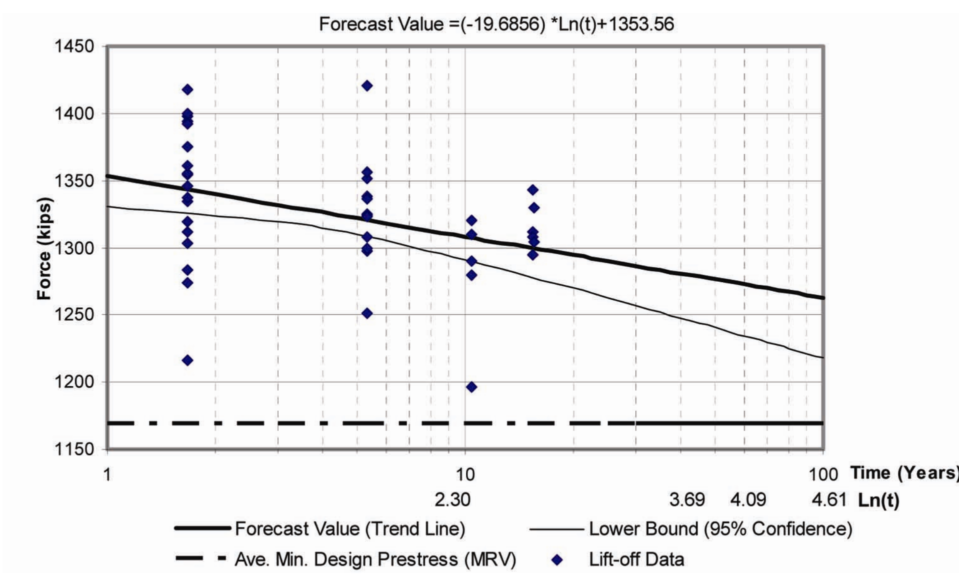

Figure 4.5-4 - Regression Analysis of Unit 2 Horizontal (Hoop) Tendon Lift-off Data through the 20-Year Surveillance

4.6 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

Summary Description

NUREG-1800, Section 4.6, observes that some designs of containment liners, their anchors to the concrete pressure vessel, and their penetrations may be based on an assumed number of loading cycles for the current operating term.

The STP containment building design report cites Bechtel Topical Reports BC-TOP-1, *Containment Building Liner Plate Design Report* and BC-TOP-5-A, *Prestressed Concrete Nuclear Reactor Containment Structures* for design of the reactor building containment and the containment liner. The containment structure was primarily designed in accordance with the Proposed ACI 359-ASME Code, Section III, Division 2, issued for trial use and comments in 1973, including subsequent addenda 1 through 6.

A review of the penetration specification, liner specification, containment building design report, and design calculations, found that the application of cyclic limits to the design is time-dependent only for design of the personnel and emergency airlocks and some of the process penetrations. See Sections 4.6.1 and 4.6.2.

Design Criteria and Design Codes

The STP post-tensioned concrete containment vessels are poured against steel membrane liners. No credit is taken for the liner for the pressure design of the containment vessel, but the liner and penetrations ensure the vessel is leak-tight, and its electrical, process, personnel airlock, and equipment hatch penetrations are part of the containment pressure boundary.

The liner specification also states that fatigue will be evaluated per NE-3222.4 and NE-3131(d) of ASME Section III. ASME Section III Division 1, Subsection NE, 1974 and later, subparagraph NE-3222.4, provides rules for a fatigue analysis of MC components for specified operating conditions involving cyclic application of loads and thermal conditions. NE-3222.4(d) provides rules for waiver of a fatigue analysis. Since the reference is to ASME subsection NE, any TLAAs arising from its use would apply only to the containment liner, penetrations, airlocks, and hatches, which are discussed below.

Analysis

Liner Plate

The STP containment liner and penetrations were designed to BC-TOP-1 and ASME Section III, Division 2 issued for trial comment in 1973, including Addenda 1 through 6. A thorough search of the current licensing basis and of the liner specification and the containment building design report found no indication within them of any fatigue analysis, or of design for a stated number of cyclic loads, for the containment liner plate. Therefore, liner plate fatigue is not a TLAA by 10 CFR 54.3(a), Criterion 6.

Equipment Hatches

The design report for the Unit 1 and 2 equipment hatches states that they were designed to ASME Section III Division 1 Subsection NE, 1971 Edition, Winter 1973 addenda. However the design report exhibits no design for a stated number of load cycles, nor any other evidence of a TLAA. Therefore, equipment hatch fatigue is not a TLAA by 10 CFR 54.3(a), Criterion 3.

Personnel and Emergency (Auxiliary) Airlocks

The personnel and emergency (auxiliary) airlocks were specified to ASME III Division 1, Subsection NE - *Class MC Components,* 1974 Edition, Winter 1974 addenda. Both were analyzed to the Winter 1975 Addenda. An NB-3222.4(d) fatigue waiver for each depends in part on the assumed number of load cycles and is therefore a TLAA. See Section 4.6.1.

Polar Crane Brackets

The polar crane is supported on a system of girders, which are supported by a series of brackets that are attached to the containment shell. Design of the polar crane brackets neither reports nor specifies a fatigue analysis. The containment building design report indicates no time-dependent analyses of the brackets. The polar crane and its supporting brackets and girders design was silent on the subject of fatigue. The current steel code specifies that no evaluation of fatigue resistance is required if the number of cycles of application of live load is less than 20,000. This is much greater than the expected 3,542 lifts for the polar crane. Therefore, design of the polar crane brackets for a finite number of loads is not supported by a TLAA. Polar crane fatigue is not a TLAA by 10 CFR 54.3(a), Criterion 3. See Section 4.7.1 for design of the polar crane itself.

Penetrations

The design of a number of containment penetrations includes a fatigue analysis TLAA. See Section 4.6.2.

4.6.1 Fatigue Waivers for the Personnel Airlocks and Emergency Airlocks

Summary

The design of the personnel and emergency airlocks included an ASME Section III NE-3222.4(d) fatigue waiver analysis to confirm that a fatigue analysis was not required. However, the fatigue waiver analyses themselves depend on the number of assumed load cycles, and are therefore TLAAs.

Analysis

Fatigue Waiver for the Personnel Airlocks

The fatigue waiver for the personnel airlocks applied values from the reactor containment structures specification to determine if the six criteria of ASME Section III NE-3222.4(d) are met. The fatigue waiver analysis demonstrated that the specified maximum allowable 1900 startup and shutdown cycles satisfies the ASME NE-3222.4(d) criteria. This allowable number of cycles is much higher than the assumed 120 cycles.

Fatigue Waiver for the Emergency (Auxiliary) Airlocks

The fatigue waiver for the emergency (auxiliary) airlocks assumed three values not supplied by the reactor containment structures specification to determine if the six criteria of ASME Section III NE-3222.4(d) are met.

- Test Temperature and Pressure 10 cycles
- Operating Temperature 300 cycles
- OBE 500 cycles

For this fatigue waiver, analysis of the emergency (auxiliary) airlocks ASME NE-3222.4(d) Criteria 4 and 6 are time-dependent. The fatigue waiver analysis demonstrated that the assumed conservative operating temperature range was within the limit determined for the assumed number of cycles by ASME NE-3222.4(d) Criterion 4, and will remain so even if the assumed number of cycles is increased from 300 to 450 to account for the period of extended operation. The analysis demonstrated that the stress range allowed by Criterion 6 for the expected number of mechanical cycles will not be exceeded if the assumed number of cycles is increased from 500 to 750 to account for the period of extended operation.

Disposition: Projection, 10 CFR 54.21(c)(1)(ii)

The fatigue waivers remain valid if the number of operating temperature cycles assumed for evaluation are each increased by a factor of 1.5 to account for the period of extended operation. Therefore the fatigue waivers will remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

4.6.2 Fatigue Design of Containment Penetrations

Summary

A thorough search of the licensing basis and of design documents identified all containment penetrations whose design is supported by a fatigue or cyclic load analysis. These analyses are TLAAs.

Analysis

STP evaluated the criteria in ASME III NC-3219.2(a) to determine whether fatigue analyses of penetrations are required. The calculation determined that fatigue analyses are necessary for main steam (M-1 through M-4), feedwater (M-5 through M-8), auxiliary feedwater (M-83, M-84, M-94, and M-95), and steam generator blowdown (M-62 through M-65) penetrations. Further examination of the design reports and calculations for each penetration type identified an additional fatigue analysis of sample line penetrations M-85 and M-86. Table 4.6-1 summarizes the result of this document review. The penetration fatigue analyses were calculated in accordance with ASME Boiler and Pressure Vessel Code NC-3200.

Fuel Transfer Tube Bellows

The fuel transfer tube penetration connects the refueling canal (inside the reactor containment building) to the spent fuel pool (inside the fuel handling building) and consists of a stainless steel pipe inside of a carbon steel sleeve. Stainless steel casing pipes with expansion bellows are welded to both ends of the sleeve. These bellows allow differential movement between the buildings on the outside of the containment wall and between the containment liner and the refueling cavity concrete on the inside. The casing pipe and the bellows in the fuel handling building perform a leakage boundary intended function and are within the scope of license renewal. The casing pipe and the bellows inside the containment building are part of the containment pressure boundary and are within the scope of license renewal with a structural pressure boundary intended function. Each of these bellows was designed for 1,000 cycles of expansion and contraction, therefore these design analyses are TLAAs requiring evaluation for the period of extended operation.

In order to determine if the design analyses remain valid for 60 years of operation, the number of cycles for 60 years has been conservatively projected. For each of these components, one thermal cycle occurs during each refueling operation. The design number of refueling operations is 80 cycles (120 cycles when multiplied by 1.5 for 60 years). In addition to these cycles, the fuel transfer canal penetration assembly is exposed to pressurization cycles during Integrated Leak Rate Tests, conservatively projected to occur once every 5 years. This contributes 12 cycles in 60 years. These penetrations would also be exposed to up to 1 Safe Shutdown Earthquake cycle. Therefore, the total cycles projected for 60 years are a fraction of the design cycles analyzed for these bellows.

Disposition: Validation, 10 CFR 54.21(c)(1)(i) and Aging Management, 10 CFR 54.21(c)(1)(iii)

Validation, 10 CFR 54.21(c)(1)(i)

The total cycles of 120 refueling operations, 12 Integrated Leak Rate Tests, and 1 Safe Shutdown Earthquake projected for 60 years are a fraction of the 1,000 design cycles analyzed for these bellows. Therefore the analyses of all of these penetrations remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Aging Management, 10 CFR 54.21(c)(1)(iii)

The fatigue analyses of the containment penetration pressure boundaries are dependent on the assumed 40-year number of transient cycles. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section 4.3.1 and B3.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Table 4.6-1 Containment Penetration Assemblies

Number	Description	Fatigue Analysis	40-YearCUF
M-1	Main Steam Penetration	NC-3219.2	0.2570
M-2	Main Steam Penetration	NC-3219.2	0.2570
M-3	Main Steam Penetration	NC-3219.2	0.2570
M-4	Main Steam Penetration	NC-3219.2	0.2570
M-5	Feedwater Penetration	NC-3200	0.5416, 0.8 for 800 seismic anchor movement (SAM) OBE cycles
M-6	Feedwater Penetration	NC-3200	0.5416, 0.8 for 800 seismic anchor movement (SAM) OBE cycles
M-7	Feedwater Penetration	NC-3200	0.5416, 0.8 for 800 seismic anchor movement (SAM) OBE cycles
M-8	Feedwater Penetration	NC-3200	0.5416, 0.8 for 800 seismic anchor movement (SAM) OBE cycles
M-62	SG Blowdown System Penetration	NC-3219.2 Ke, NB-3228.3	0.539
M-63	SG Blowdown System Penetration	NC-3219.2 Ke, NB-3228.3	0.539

Table 4.6-1 Containment Penetration Assemblies

Number	Description	Fatigue Analysis	40-YearCUF
M-64	SG Blowdown System Penetration	NC-3219.2 Ke, NB-3228.3	0.539
M-65	SG Blowdown System Penetration	NC-3219.2 Ke, NB-3228.3	0.539
M-83	Auxiliary Feedwater Penetration	NC-3200 Ke, NB-3228.3	0.397
M-84	Auxiliary Feedwater Penetration	NC-3200 Ke, NB-3228.3	0.397
M-85	RCDT Vent and Supply Lines Instrumentation Line Penetration	NC-3200 Ke, NB-3228.3	0.22
M-86	RCDT Vent and Supply Lines Instrumentation Line Penetration	NC-3200 Ke, NB-3228.3	0.22
M-89	Fuel Transfer Tube	NE-3222.4 NE-3131(d)	Fatigue Tests
M-90	Personnel Airlock	Fatigue Waiver	N/A
M-91	Emergency (Auxiliary) Airlock	Fatigue Waiver	N/A
M-94	Auxiliary Feedwater Penetration	NC-3200	0.394
M-95	Auxiliary Feedwater Penetration	NC-3200	0.394

4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

4.7.1 Load Cycle Limits of Cranes, Lifts, and Fuel Handling Equipment Designed to CMAA-70

Summary Description

UFSAR, Section 9.1.4 describes design of the following lifting machines:

- New fuel handling area overhead crane
- Cask handling overhead crane
- Fuel handling building overhead crane
- Containment polar crane
- Fuel handling machines
- Refueling machine
- New fuel elevator
- Fuel transfer system

Analysis

The crane service classification (hereinafter “class” or “service level”) for each machine depends, in part, on the assumption that the number of stress cycles at or near the maximum allowable stress will not exceed the number assumed for that design class. In operation, this means the number of lifts which approach or equal the design load (significant lifts) will not exceed the number of stress cycles assumed for that design class. Table 4.7-1 provides the estimated maximum number of significant crane lifts. The designs of these machines for these standard numbers of lifts for the plant lifetime are therefore TLAAs.

Crane Design and operation

The New Fuel Handling Area Overhead Crane is designed to handle fuel assemblies and their shipping containers in the new fuel handling area.

The Cask Handling Overhead Crane is designed to three primary operations:

1. Transfer the spent fuel cask from the bed of the transport vehicle to the cask decontamination area.

2. Lower the cask into the dry cask handling system transporter tank following inspection or walkdown.

3. Return the cask to the transport vehicle following fuel loading operations.

The Fuel Handling Building Overhead Crane is designed to five primary operations:

1. Transfer the new fuel shipping containers from the transport vehicle to the new fuel handling area.

2. Transfer the new fuel assemblies from the new fuel handling area to the new fuel storage area or to the new fuel elevator.

3. Transfer the spent fuel shipping cask head from the cask to its storage shelf in the cask loading pool, and to lower the head onto the cask.

4. Replace the safety injection and containment spray pumps.

5. Perform general service and maintenance operations as required.

The Containment Polar Crane is evaluated to refueling and fuel handling operations. It is also used for construction, maintenance, and repair operations as needed. This crane is classified as non-nuclear safety (NNS) class since it neither provides nor supports any system safety function.

The Refueling Machine is designed to transfer fuel from one location to another.

The Fuel Handling Machine is designed to handling fuel assemblies and core components in the spent fuel pool by means of handling tools suspended from the hoist. The fuel handling machine has a two-step magnetic control for the bridge and hoist.

The New Fuel Elevator is designed to lowering a new fuel assembly into the fuel transfer canal. It can also be used to raise a new or spent fuel assembly.

The Fuel Transfer System is designed to transfer fuel between the reactor containment building and the fuel handling building. A hydraulically actuated lifting arm (upender) at each end of the transfer tube is used to take the fuel from a vertical position to a horizontal position to pass through the transfer tube and then back into the vertical position for placement.

Estimated Lifts

The number of significant lifts for each machine per refueling outage is estimated from the UFSAR Section 9.1.4.2.2 description of refueling operations. This number is then multiplied by a factor of 1.5 to account for non-refueling lifts. Based on an 18-month refuel cycle, approximately 27 refuel cycles are expected over a 40-year plant design life, or about 40 in a 60-year design life.

Table 4.7-1 Estimated Maximum Number of Significant Crane Lifts

Lifting Machine	Per Refuel (Pr)	Per Refuel Estimate, Pr x 1.5	40 year Cycles	60 year Cycles, (1.5 x 40 year) (except as noted)	Design Lifts
New Fuel Handling Area Overhead Crane	132	198	5,346	8,019	100,000
Cask Handling Overhead Crane	21	32	420 (10 refuels)	740 (20 refuels)	100,000
Fuel Handling Building Overhead Crane	312	468	12,636	18,954	100,000
Containment Polar Crane	54	81	2,411	3,542	200,000
Refueling Machine	436	654	17,658	26,487	100,000
Fuel Handling Machine	745	1,118	30,186	45,279	100,000
New Fuel Elevator	66	99	2,673	4,010	100,000
Fuel Transfer System	436	654	17,658	26,487	100,000

Results

The new fuel handling area overhead crane, the cask handling overhead area crane, the fuel handling building overhead crane, the containment polar crane, the refueling machine, the fuel handling machine, the new fuel elevator, and the fuel transfer system will experience only a fraction of their rated lifetime number of lifts over 60 years. Therefore, the designs of all of these lifting machines remain valid for the period of extended operation.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The design standard full-capacity lifts for each machine exceeds the number expected of the machine for a 60-year period of extended operation. The designs of these machines therefore remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

4.7.2 In-Service Flaw Growth Analyses that Demonstrate Structural Stability for 40 years

In-service flaw growth is identified in NUREG-1800 as a potential TLAA. A search of the CLB did not identify any flaws evaluated for the remaining life of the plant other than those discussed elsewhere in this application:

- The flaw growth analysis of the half-nozzle repair on the Unit 1 bottom mounted instrumentation (BMI) nozzle. This is a TLAA which will remain valid for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i). See Section 4.3.2.1.

- The pressurizer structural weld overlay repairs and mitigations performed on Unit 1 and 2 pressurizer nozzles. The flaw growth analysis does not qualify cracks for the life of the plant, but only the 10-year inspection interval. Therefore, this analysis is not a TLAA by 10 CFR 54.3(a) Criterion 3. See Section 4.3.2.4.

4.7.3 TLAA for the Corrosion Effects in the Essential Cooling Water (ECW) System

In response to NRC Generic Letter 89-13, STP committed to implementation and maintenance of a surveillance and control program to significantly reduce the incidence of flow blockage problems as a result of biofouling. Included in this response is a statement that "Scaling and corrosion inhibitors are also added to the ECW." This commitment was subsequently revised, and the use of corrosion inhibitors was discontinued at STP, based on the following:

Without the inhibitors, the corrosion rate is 0.6 mil/year compared to less than 0.1 mil/year with the inhibitor. Assuming 40 years of service life, this will not result in corrosion exceeding the design level of 40 mils. This conclusion is based on a 40-year plant life. Therefore, this analysis is a TLAA.

Disposition: Aging Management, 10 CFR 54.21(c)(1)(iii)

Corrosion effects in the essential cooling water system are managed under the Open-Cycle Cooling Water program described in B2.1.9. Therefore, corrosion effects will be managed during the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

4.7.4 Absence of a TLAA for Reactor Vessel Underclad Cracking Analyses

Summary Description

NUREG-1800 identifies "Intergranular separation in the heat-affected zone (HAZ) of reactor vessel low-alloy steel under austenitic SS cladding" as a potential TLAA. No such cracks have been discovered at STP, nor analyzed, in the absence of which no such TLAA exists. This phenomenon has also been addressed in the STP vessels by weld cladding processes designed to avoid these defects, consistent with Regulatory Guide 1.43, *Control of Stainless Steel Weld Cladding of Low Alloy Steel Components*.

Analysis

Westinghouse summarized fatigue crack growth analyses and ASME Section XI allowable flaw size evaluations for typical Westinghouse vessels.

Underclad cracks were first discovered in October 1970 during examination of the Atucha reactor vessel. They have been reported to exist only in SA-508, Class 2 reactor vessel forgings manufactured to a coarse grain practice and clad by high-heat-input submerged arc processes.

The question of the existence of a TLAA for underclad cracking rests on (1) the susceptibility of the STP reactor nozzles, safe ends, flanges, and top and bottom head cap forgings to this phenomenon, and (2) on the detection of any such cracks in the STP vessels. Neither the Westinghouse report nor the NRC staff safety evaluation of it requires an inspection to detect such cracks. No cracks have been detected in the STP vessels underclad, nor therefore have any been analyzed. In the absence of an analysis, no TLAA exists.

South Texas Vessel Material that Might be Subject to Underclad Cracking

At STP only the vessel carbon steel forgings are SA-508 Class 2. The clad is stainless steel weld metal, Analysis A-7; and Ni-Cr-Fe Weld Metal, F-Number 43.

The STP ISI program examines flanges under IWB Table 2500-1 Category B-A, and examines RV nozzles under Category B-D. A review of the Examination Reports found no record of indications in the RV nozzles or flanges.

Qualification of Clad Welding Processes to Avoid Underclad Cracking

Although the STP vessels contain these SA-508 forgings clad by high-heat-input processes, the procedure qualification for cladding low alloy steel (SA-508 Class 2) requires a special evaluation to assure freedom from underclad cracking.

Westinghouse meets the intent of RG 1.43 by requiring qualification of any high-heat process, such as the submerged-air wide-strip welding process and the submerged-arc-6-wire process used on SA-508 Class 2 material, with a performance test as described in regulatory position 2 of the guide. No qualifications are required by the RG for SA-533 material and equivalent chemistry for forging grade SA-508 Class 3 material.

Production welding is monitored to ensure that essential variables remain within the limits established by the qualification. If the essential variables exceed the qualification limits, an evaluation will be performed to determine if the cladding is acceptable for use.

Applicability of Westinghouse Generic 60-Year Flaw Growth Analysis to South Texas

Westinghouse reports a generic 60-year flaw growth analysis which assumes 1.5 times the number of 40-year design basis cycles and found that the expected maximum flaw predicted by the crack growth analysis is less than the Section XI allowable flaw size. It therefore demonstrated that these effects are acceptable for a 60-year life. The NRC safety evaluation of this topical report determined that it might be incorporated by reference in a license renewal application, provided that the analysis is applicable to the applicant’s plant.

This Westinghouse topical report could be applied to STP. The cyclic and transient load assumptions of this topical report bound those expected in the STP vessels for the 60-year life. If invoked, the topical report would be a TLAA valid for the period of extended operation. However, in the absence of underclad cracks requiring this analysis, the topical report has not been applied to STP. This report is therefore not part of the STP CLB and is not a TLAA by 10 CFR 54.3(a), Criterion 6.

4.7.5 Reactor Coolant Pump Flywheel Fatigue Crack Growth Analysis

Summary Description

NUREG-1800 identifies “Fatigue analysis of the reactor coolant pump flywheel” as a potential TLAA.

During normal operation, the reactor coolant pump flywheel possesses sufficient kinetic energy to potentially produce high-energy missiles inside containment and could also damage pump seals or other pressure boundary components in the unlikely event of failure. Conditions that may result in overspeed of the reactor coolant pump may increase both the potential for failure and the kinetic energy. The aging effect of concern is fatigue crack initiation in the flywheel bore keyway. This concern is the subject of Regulatory Guide 1.14, *Reactor Coolant Pump Flywheel Integrity*. At STP, flywheel fatigue is a recognized aging effect, and is the subject of a TLAA.

Analysis

UFSAR, Section 5.4.1.5.2, describes RCP flywheel design and its compliance with Regulatory Guide 1.14. The flywheel inspections are included in the STP In-service Inspection (ISI) Program and are required by STP Technical Specification 4.4.10.

To reduce the inspection frequency and scope STP amended its initial compliance with Regulatory Guide 1.14 by implementing a Westinghouse Topical Report on Reactor Coolant Pump Motor Flywheel Inspection Elimination, which supports relaxation of inspections required by Regulatory Guide 1.14 Position C.4.b(1) and (2).

The topical report performed a Monte-Carlo simulation to evaluate the probability of failure over the period of extended operation for all operating Westinghouse plants. It demonstrated that the flywheel design has a high structural reliability with a very high flaw tolerance and negligible flaw crack extension over a 60-year service life (assumed 6000 pump starts). This evaluation is time dependent and therefore is a TLAA.

Disposition: Validation, 10 CFR 54.21(c)(1)(i)

The evaluation of the RCP flywheel demonstrates that crack growth over a 60 year service life is negligible. The evaluation is therefore valid for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

APPENDIX A

FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

A0 APPENDIX A INTRODUCTION

Introduction

This appendix provides the information to be submitted in a Supplement to the Updated Final Safety Analysis Report (UFSAR) Update as required by 10 CFR 54.21(d) for the STP License Renewal Application. Section A1 of this appendix contains summary descriptions of the programs used to manage the effects of aging during the period of extended operation. Section A2 contains summary descriptions of programs used for management of time-limited aging analyses during the period of extended operation. Section A3 contains evaluation summaries of TLAAs for the period of extended operation. Section A4 contains summary descriptions of license renewal commitments. These summary descriptions of aging management programs, time-limited aging analyses, and license renewal commitments will be incorporated in the STP UFSAR Update following issuance of the renewed operating license in accordance with 10 CFR 50.71(e).

A1 SUMMARY DESCRIPTIONS OF AGING MANAGEMENT PROGRAMS

The integrated plant assessment and evaluation of time-limited aging analyses (TLAA) identified existing and new aging management programs necessary to provide reasonable assurance that components within the scope of license renewal will continue to perform their intended functions consistent with the current licensing basis (CLB) for the period of extended operation. Sections A1 and A2 describe the programs and their implementation activities.

Three elements common to all aging management programs discussed in Sections A1 and A2 are corrective actions, confirmation process, and administrative controls. The STP Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, and is applicable to the safety-related and nonsafety-related systems, structures, and components that are subject to aging management activities.

A1.1 ASME SECTION XI INSERVICE INSPECTION, SUBSECTIONS IWB, IWC, AND IWD

ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program manages cracking, loss of fracture toughness, and loss of material in Class 1, 2, and 3 piping and components within the scope of license renewal. The program includes periodic visual, surface, volumetric examinations and leakage tests of Class 1, 2 and 3 pressure-retaining components, including welds, pump casings, valve bodies, integral attachments, and pressure-retaining bolting. STP inspections meet ASME Section XI requirements. STP will use the ASME Code Edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

A1.2 WATER CHEMISTRY

The Water Chemistry program manages loss of material, cracking, reduction of heat transfer, and wall thinning in primary and secondary water systems. The program is a mitigation program that consists of a primary water chemistry program and a secondary water chemistry program. The program relies on monitoring and control of primary and secondary water chemistry to mitigate damage caused by loss of material and cracking. The Water Chemistry program does not provide for the detection of aging effects. The Water Chemistry program is based on the guidelines of EPRI TR-105714, Revision 6, *PWR Primary Water Chemistry Guidelines*, and EPRI TR-102134, Revision 7, *PWR Secondary Water Chemistry Guidelines*.

The One-Time Inspection program (A1.16) verifies the effectiveness of the Water Chemistry program.

A1.3 REACTOR HEAD CLOSURE STUDS

The Reactor Head Closure Studs program manages cracking and loss of material by conducting ASME Section XI inspections of reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings. The program includes periodic visual, surface, and volumetric examinations of reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings and performs visual inspections of the reactor vessel flange closure during primary system leakage tests. The program implements ASME Section XI code, Subsection IWB, and detects reactor vessel stud, nut, washer, and bushing cracking, loss of material due to wear and corrosion, and reactor coolant leakage from the reactor vessel flange. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

A1.4 BORIC ACID CORROSION

The Boric Acid Corrosion program manages loss of material due to boric acid leakage. The program includes provisions to identify, inspect, examine and evaluate leakage, and initiate corrective actions. Long-term corrective actions to control boric acid leakage, to impede boric acid leakage, to impede boric acid attack, and to prevent recurrence of previous problems include operating changes and design changes such as the use of suitable materials, protective coatings and cladding. Any increases of RCS leakage during RCS leakage surveillances require the investigation of potential RCS leakage sources. The principal industry guidance document used is WCAP-15988-NP, *Generic Guidance for an effective Boric Acid Inspection Program for Pressurized Water Reactors*. The program relies in part on implementation of recommendations of NRC Generic Letter 88-05, *Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants*. Additionally, the program includes examinations conducted during ISI pressure tests performed in accordance with ASME Section XI requirements. The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program (A1.5) and the Nickel-Alloy Aging Management program (A1.34), as well as the Boric Acid Corrosion control program, implement inspections of reactor coolant pressure boundary components to identify degradation.

A1.5 NICKEL-ALLOY PENETRATION NOZZLES WELDED TO THE UPPER REACTOR VESSEL CLOSURE HEADS OF PRESSURIZED WATER REACTORS

The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program manages cracking due to primary water stress corrosion in nickel-alloy vessel head penetration nozzles and associated welds as well as loss of material in the reactor vessel closure head. This program was developed in response to NRC Order EA-03-009. ASME Code Case N-729-1, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii), has superseded NRC Order EA-03-009.

Detection of leaking is accomplished through bare metal visual examinations (external surface of head). Detection of cracking is accomplished through surface and volumetric examination (underside of head) techniques.

The Unit 1 RPV head was replaced during 1RE15 (October 2009). The Unit 2 RPV head was replaced during 2RE14 (April 2010). Components penetrating the new reactor vessel closure heads and components welded to the inner surfaces of the reactor vessel closure heads are fabricated and welded using PWSCC resistant materials.

A1.6 FLOW-ACCELERATED CORROSION

The Flow-Accelerated Corrosion (FAC) program manages wall thinning due to flow-accelerated corrosion on the internal surfaces of carbon or low alloy steel piping and system components which contain high energy fluids (both single phase and two phase).

The objectives of the FAC program are achieved by (a) identifying system components susceptible to FAC, (b) an analysis using a predictive code such as CHECWORKS to determine critical locations for inspection and evaluation, (c) providing guidance for follow-up inspections, (d) repairing or replacing components, as determined by the guidance provided by the program, and (e) continual evaluation and incorporation of the latest technologies, industry and plant in-house operating experience.

Procedures and methods used by the FAC program are consistent with STP commitments to NRC Bulletin 87-01, *Thinning of Pipe Wall in Nuclear Power Plants*, and NRC Generic Letter 89-08, *Erosion/Corrosion-Induced Pipe Wall Thinning*. The program relies on implementation of the EPRI guidelines of NSAC-202L, *Recommendations for an Effective Flow Accelerated Corrosion Program*.

A1.7 BOLTING INTEGRITY

The Bolting Integrity program manages cracking, loss of material, and loss of preload for pressure retaining bolting and ASME component support bolting. The program includes preload control, selection of bolting material, use of lubricants/sealants consistent with EPRI NP-5067, *Good Bolting Practices*, and performance of periodic inspections for indication of aging effects. The program also includes inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting.

STP good bolting practices are established in accordance with plant procedures. These procedures include requirements for proper disassembling, inspecting, and assembling of connections with threaded fasteners. In addition to the inspection activities noted above, the Bolting Integrity program includes activities for preload control, material selection and control, and use of lubricants/sealants. The general practices that are established in this program are consistent with EPRI NP-5769, *Degradation and Failure of Bolting in Nuclear Power Plants*, Volume 1 and 2, and the recommendations delineated in NUREG-1339.

A1.8 STEAM GENERATOR TUBE INTEGRITY

The Steam Generator Tube Integrity program manages cracking and loss of material of the following component types: steam generator tubes, tube support plates, secondary side access covers, secondary nozzles, moisture separators, primary head and divider plates, internal structures, flow distribution baffles, feedwater rings, and auxiliary feedwater (AFW) spray pipes. The program manages the cracking of plugs. The program also manages the wall thinning of the following component types: upper steam drum internals, moisture separators, feedwater rings, and AFW spray pipes. The program ensures the integrity of the primary to secondary pressure boundary through preventive measures, inspections, degradation assessments, condition monitoring, operational assessments, tube plugging, and leakage monitoring activities necessary to manage potential steam generator tube degradation, including mechanically induced phenomena, such as wear and impingement damage. The aging management measures employed include nondestructive examinations, visual inspection, sludge removal, tube plugging, in-situ pressure testing and maintaining the chemistry environment by removal of impurities and addition of chemicals to control pH and oxygen. NDE inspection and primary to secondary leak rate monitoring are conducted consistent with the requirements of STP Units 1 and 2 Technical Specifications and NEI 97-06, Revision 2, *Steam Generator Program Guidelines*. Performance criteria are maintained for operational leakage, accident induced leakage and structural integrity as prescribed in the Technical Specifications. Tube structural integrity limits consistent with Regulatory Guide 1.121 are applied.

A1.9 OPEN-CYCLE COOLING WATER SYSTEM

The Open-Cycle Cooling Water System program manages cracking, loss of material, and reduction of heat transfer for components within the scope of license renewal and exposed to the raw water of the essential cooling water system. Included are components of the essential cooling water system that are within the scope of license renewal, the component cooling water heat exchangers and the other safety related heat exchangers cooled by the essential cooling water system. The program includes chemical treatment and control of biofouling, periodic inspections, flushes and physical and chemical cleaning, and heat exchanger performance testing/ inspections to ensure that the effects of aging will be managed during the period of extended operation. The program is consistent with STP commitments as established in responses to NRC Generic Letter 89-13, *Service Water System Problems Affecting Safety-Related Components*.

A1.10 CLOSED-CYCLE COOLING WATER SYSTEM

The Closed-Cycle Cooling Water (CCCW) System program manages loss of material, cracking, and reduction in heat transfer for components within the scope of license renewal in closed-cycle cooling water systems. The program includes (1) preventive measures to minimize corrosion including maintenance of corrosion inhibitor and biocide concentrations, and (2) periodic system and component testing and inspection. Preventive measures include the monitoring and control of chemistry parameters following the guidance of EPRI TR-107396, Revision 1. Periodic inspection and testing to minimize aging and evaluate system and component performance are performed in accordance with EPRI TR-107396 and industry and plant operating experience.

A1.11 INSPECTION OF OVERHEAD HEAVY LOAD AND LIGHT LOAD (RELATED TO REFUELING) HANDLING SYSTEMS

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program manages loss of material for all cranes, trolley and hoist structural components, fuel handling equipment and applicable rails within the scope of license renewal. Program inspection activities verify the structural integrity of the components required to maintain their intended function. The inspection requirements are consistent with the guidance provided NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants*, for load handling systems that handle heavy loads which can directly or indirectly cause a release of radioactive material, applicable industry standards (such as CMAA Spec 70) for other components within the scope of license renewal in the program, and applicable OSHA regulations (such as 29 CFR Volume XVII, Part 1910 and Section 1910.179).

A1.12 FIRE PROTECTION

The Fire Protection program manages loss of material of fire rated doors, fire dampers and the Halon fire suppression system, concrete cracking, spalling, and loss of material of fire barrier walls, ceilings and floors and increased hardness, shrinkage, and loss of strength of fire barrier penetration seals. The Fire Protection program is a condition and performance monitoring program comprised of tests and inspections that follow the applicable National Fire Protection Association (NFPA) recommendations.

Periodic visual inspections are performed on fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, including coating and wraps (raceway fire wrap and hatch covers). Visual inspections and functional tests are performed on fire-rated doors to verify the integrity of door surfaces and to check clearances. Visual inspections are performed to identify conditions of corrosion and mechanical damage in the Halon flow path. The Halon fire suppression system is functionally tested on a periodic basis.

A1.13 FIRE WATER SYSTEM

The Fire Water System program manages loss of material for water-based fire protection systems consisting of piping, fittings, valves, sprinklers, nozzles, hydrants, hose stations, standpipes and water storage tanks. Periodic hydrant inspections, fire main flushing, sprinkler inspections, and flow tests in accordance with National Fire Protection Association (NFPA) codes and standards ensure that the water-based fire protection systems are capable of performing their intended function. The fire water system pressure is continuously monitored such that loss of system pressure is immediately detected and corrective actions are initiated.

The Fire Water System program conducts an air or water flow test through each open head spray/sprinkler nozzle to verify the flow is unobstructed. Non-intrusive volumetric examinations will be performed on representative samples of fire water piping to detect any loss of material due to corrosion, to ensure that aging effects are managed, wall thickness is within acceptable limits and degradation will be detected before the loss of intended function. Otherwise, internal inspections are used to evaluate wall thickness to identify evidence of loss of material.

A1.14 FUEL OIL CHEMISTRY

The Fuel Oil Chemistry program manages loss of material on the internal surface of components in the standby diesel generator (SDG) fuel oil storage and transfer system, diesel fire pump fuel oil system and balance of plant (BOP) fuel oil system. The program includes (a) surveillance and monitoring procedures for maintaining fuel oil quality by controlling contaminants in accordance with applicable ASTM Standards, (b) periodic draining of water from fuel oil tanks, (c) visual inspection of internal surfaces during periodic draining and cleaning, (d) ultrasonic wall thickness measurement or pulsed eddy current wall thickness measurement of fuel oil tank bottoms during periodic draining and cleaning, (e) inspections of new fuel oil before it is introduced into the fuel oil tanks, and (f) one time inspection of a representative sample of components in systems that contain fuel oil by the One-Time Inspection program (A1.16).

The effectiveness of the program is verified under the One-Time Inspection program (A1.16).

A1.15 REACTOR VESSEL SURVEILLANCE

The Reactor Vessel Surveillance program manages loss of fracture toughness of the reactor vessel beltline material. The Reactor Vessel Surveillance program for STP is designed to ASTM E 185 and complies with 10 CFR 50 Appendix H. Actual reactor vessel coupons are used. The surveillance coupons are tested by a qualified offsite vendor, to its procedures. The testing program and reporting conform to the requirements of ASTM E 185-82.

The removal schedule of the surveillance coupons will yield data with exposures greater than that expected in 60 years of operation. This withdraw schedule therefore meets the ASTM E 185-82 criterion which states that capsules may be removed when the capsule neuron fluence is between one and two times the limiting fluence calculated for the vessel at the end of expected life.

Vessel fluence for both units will be determined by ex-vessel dosimetry after all capsules have been removed.

A1.16 ONE-TIME INSPECTION

The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (A1.2), Fuel Oil Chemistry program (A1.14), and Lubricating Oil Analysis program (A1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer. The One-Time Inspection program determines non-destructive examination (NDE) sample size for each material-environment group using established statistical methodologies and selects piping/component inspection locations within the sample that are based on service period, operating conditions, and design margins. The One-Time Inspection program specifies corrective actions and increased sampling of components if aging effects are found.

This new program will be implemented and completed within the 10 year period prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

A1.17 SELECTIVE LEACHING OF MATERIALS

The Selective Leaching of Materials program manages loss of material due to selective leaching for copper alloys with greater than 15 percent zinc and gray cast iron components exposed to treated and raw water within the scope of license renewal. The Selective Leaching of Materials program is applied in addition to the Open-Cycle Cooling Water program (A1.9) and the Closed-Cycle Cooling Water program (A1.10).

The Selective Leaching of Materials program will be implemented during the 10 years prior to the period of extended operation. The procedure will include a one-time inspection of a sample of components made from gray cast iron and copper alloys with greater than 15 percent zinc. This procedure will provide for visual and mechanical inspections for each system/material/environment combination and for follow-up engineering evaluation in the event that graphitization of gray cast iron or dezincification of copper alloys with greater than 15 percent zinc components is detected. The plant-specific Selective Leaching of Aluminum Bronze program (A1.37) covers aluminum bronze components.

A1.18 BURIED PIPING AND TANKS INSPECTION

The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried, underground, and limited-access components. Opportunistic visual inspections monitor the condition of protective coatings and wrappings found on steel, stainless steel and copper alloy components. Gray cast iron, which is included under the definition of steel, is also subject to a loss of material due to selective leaching, which is an aging effect managed by the Selective Leaching of Materials program (A1.17). Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.

The Buried Piping and Tanks Inspection program performs opportunistic inspections whenever pipes are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.

A1.19 ONE-TIME INSPECTION OF ASME CODE CLASS 1 SMALL-BORE PIPING

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program manages cracking of ASME Code Class 1 piping less than or equal to four inches nominal pipe size (NPS 4). This program is implemented as part of the fourth interval of the STP Inservice Inspection (ISI) program.

For ASME Code Class 1 small-bore piping, the ISI program requires volumetric examinations on selected butt weld locations to detect cracking. Weld locations are selected based on the guidelines provided In EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*. Volumetric examinations of butt welds are conducted in accordance with ASME Section XI with acceptance criteria from Paragraph IWB-3000 and IWB-2430. If no socket welds are in the sample population, then at least five percent of the socket welds in each unit will be selected.

Socket welds that fall within the weld examination sample will be examined following ASME Section XI Code requirements. If a qualified volumetric examination procedure for socket welds endorsed by the industry and the NRC is available and incorporated into the ASME Section XI Code at the time of STP small-bore socket weld inspections, then this will be used for the volumetric examinations. If no volumetric examination procedure for ASME Code Class 1 small bore socket welds has been endorsed by the industry and the NRC and incorporated into ASME Section XI at the time STP performs inspections of small-bore piping, a plant procedure for volumetric examination of ASME Code Class 1 small-bore piping with socket welds will be used.

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new program and inspections will be completed and evaluated within 10 years prior to the period of extended operation.

A1.20 EXTERNAL SURFACES MONITORING PROGRAM

The External Surfaces Monitoring program manages loss of material for external surfaces of steel, stainless steel, aluminum, copper alloy components and elastomers, and hardening and loss of strength for elastomers. The program includes those systems and components within the scope of license renewal that require external surface monitoring. Visual inspections of external surfaces conducted during engineering walkdowns will be used to identify aging effects and leakage. When appropriate for the component configuration and material, physical manipulation may be used to augment visual inspection to confirm the absence of elastomer hardening and loss of strength.

Loss of material for external surfaces is managed by the Boric Acid Corrosion program (A1.4) for components in a system with treated borated water or reactor coolant environment on which boric acid corrosion may occur, Buried Piping and Tanks Inspection program (A1.8) for buried components, and Structures Monitoring Program (A1.32) for civil structures, and other structural items which support and contain mechanical and electrical components.

The External Surfaces Monitoring program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

A1.21 FLUX THIMBLE TUBE INSPECTION

The Flux Thimble Tube Inspection program manages loss of material by performing wall thickness eddy current inspection of all flux thimble tubes that form part of the reactor coolant system pressure boundary. The pressure boundary includes the length of the tube inside the reactor vessel out to the seal fittings outside the reactor vessel. Eddy current inspection is performed on the portion of the tubes inside the reactor vessel. The program implements the recommendations of NRC Bulletin 88-09, *Thimble Tube Thinning in Westinghouse Reactors*.

The flux thimble tubes are currently scheduled to be inspected each refueling outage. The inspection may be deferred by using an evaluation that considers the actual wear rate. Wall thickness measurements are trended and wear rates are calculated. If the current measured wear exceeds the acceptance criteria or if the predicted wear (as a measure of percent through wall) for a given flux thimble tube is projected to exceed the established acceptance criteria prior to the next refueling outage, corrective actions are taken to reposition, cap or replace the tube. The inspection frequency may be revised as appropriate based upon items such as operating experience and recommendations from the PWR Owner's Group.

A1.22 INSPECTION OF INTERNAL SURFACES IN MISCELLANEOUS PIPING AND DUCTING COMPONENTS

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program manages cracking, loss of material, and hardening and loss of strength of the internal surfaces of piping, piping components, ducting and other components that are not inspected by other aging management programs.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that uses the work control process for preventive maintenance and surveillance to conduct and document inspections. The program performs visual inspections to detect aging effects that could result in a loss of component intended function. Visual inspections of internal surfaces of plant components are performed by qualified personnel during the conduct of periodic maintenance, predictive maintenance, surveillance testing, and corrective maintenance. Supplemental inspections not performed concurrently with planned work activities will be performed. The locations and intervals for these supplemental inspections are based on assessments of the likelihood of significant degradation and on current industry and plant-specific operating experience. Additionally, visual inspections may be augmented by physical manipulation, when appropriate for the component configuration and material, to detect hardening and loss of strength of both internal and external surfaces of elastomers, and by volumetric evaluation to detect stress corrosion cracking of the internal surfaces of stainless steel components exposed to diesel exhaust.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

A1.23 LUBRICATING OIL ANALYSIS

The Lubricating Oil Analysis program manages loss of material and reduction of heat transfer for components within the scope of license renewal that are exposed to lubricating and hydraulic oil. Acceptance criteria are based upon vendor and industry guidelines for oil chemical and physical properties and for foreign material such as water contamination. Increased contamination and degradation of oil properties provide an indication of aging of the lubricating or hydraulic oil. Monitoring and trending of lubricating and hydraulic oil properties and particles found within the oil identifies risk to components due to aging prior to loss of intended function.

The effectiveness of this program is verified under the One-Time Inspection program (A1.16).

A1.24 ELECTRICAL CABLES AND CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages embrittlement, melting, cracking, swelling, discoloration, electrical failure, and loss of dielectric strength leading to reduced insulation resistance (IR) to ensure that electrical cables, connections, and terminal blocks not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended functions.

Non-EQ cables, connections and terminal blocks within the scope of license renewal in accessible areas with an adverse localized environment are inspected. The inspections of Non-EQ cables, connectors and terminal blocks in accessible areas are representative, with reasonable assurance, of cables, connections and terminal blocks in inaccessible areas with an adverse localized environment. At least once every ten years, Non-EQ cables, connections and terminal blocks within the scope of license renewal in accessible areas with an adverse localized environment are visually inspected for embrittlement, melting, cracking, swelling, surface contamination, or discoloration.

The acceptance criterion for visual inspection of accessible non-EQ cable jacket, connection, and terminal blocks insulating material is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the QA program.

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

A1.25 INACCESSIBLE MEDIUM VOLTAGE CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages localized damage and breakdown of insulation leading to electrical failure of inaccessible medium-voltage cables exposed to adverse localized environments caused by significant moisture (moisture which lasts more than a few days) simultaneously with significant voltage (energized greater than 25% of the time), not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, and within the scope of license renewal.

All cable manholes that contain in-scope Non-EQ inaccessible medium voltage cables are being inspected for water collection. Collected water is being removed as required. This inspection and water removal is being performed based on actual plant experience with inspection frequency being at least every two years.

The program provides for testing of in-scope Non-EQ inaccessible medium voltage cables to provide an indication of the conductor insulation condition. At least once every ten years, a polarization index test as described in EPRI TR-103834-P1-2 or other testing that is state-of-the-art at the time of the testing is performed. The first test will be completed prior to the period of extended operation.

A1.26 METAL ENCLOSED BUS

The Metal Enclosed Bus program manages aging of in-scope non-segregated phase and isolated phase bus.

The non-segregated phase portion of the program manages loosening of bolted connections, embrittlement, cracking, melting, swelling, discoloration of insulation, electrical failure, loss of dielectric strength leading to reduced insulation resistance (IR), loss of material, and hardening and loss of strength to ensure that non-segregated phase buses within the scope of license renewal are capable of performing their intended function. Internal portions of non-segregated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation is inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets. A sample of the non-segregated phase bus accessible bolted connections will be inspected for loose connections using thermography.

The isolated-phase portion of the program manages the effects of cracking and loss of material of bus enclosure assemblies, hardening of boots and gaskets, and cracking of internal bus supports to ensure that isolated phase metal enclosed buses within the scope of license renewal are capable of performing their intended function. Internal portions of isolated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulators are inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets.

A1.27 ASME SECTION XI, SUBSECTION IWE

The ASME Section XI, Subsection IWE program manages cracking, loss of material, loss of sealing, and leakage through containment by providing aging management of the steel liner of the concrete containment building, including the containment liner plate and its integral attachments, containment hatches and airlocks, and pressure-retaining bolting. IWE inspections are performed in order to identify and manage any containment liner aging effects that could result in loss of intended function. Acceptance criteria for components subject to Subsection IWE exam requirements are specified in Article IWE-3000. The STP containment inservice inspections program meets the requirements of 2004 Edition of ASME Section XI, Subsection IWE (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2)(ix). In conformance with 10 CFR 50.55a(g)(4)(ii), the STP containment inservice inspections program will be updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval.

A1.28 ASME SECTION XI, SUBSECTION IWL

The ASME Section XI, Subsection IWL program manages the following aging effects of the concrete containment building and post-tensioned system:

- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity, permeability
- Loss of material
- Loss of material (spalling, scaling) and cracking

Inspections will be performed to identify and manage any aging effects of the containment concrete, post-tensioning tendons, tendon anchorages, and concrete surface around the anchorage that could result in loss of intended function. In conformance with 10 CFR 50.55a(g)(4)(ii), the ASME Section XI, Subsection IWL program will be updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval.

A1.29 ASME SECTION XI, SUBSECTION IWF

The ASME Section XI, Subsection IWF program manages loss of material, cracking, and loss of mechanical function for supports of Class 1, 2 and 3 piping and components. There are no Class MC supports at STP. In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI program is updated during each successive 120 month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval.

A1.30 10 CFR PART 50, APPENDIX J

The 10 CFR 50, Appendix J program manages cracking, loss of material, loss of leak tightness, loss of sealing, and leakage through containment. The program monitors leakage rates through the containment pressure boundary, including the penetrations and access openings, in order to detect degradation of containment pressure boundary. Seals, gaskets, and bolted connections are also monitored under the program. Containment leak rate tests are performed in accordance with 10 CFR 50 Appendix J, *Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors* (Option B); Regulatory Guide 1.163, *Performance-Based Containment Leak-Testing Program*, NEI 94-01, *Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J*; and ANSI/ANS 56.8, *Containment System Leakage Testing Requirements*.

Containment leak rate tests are performed to assure that leakage through the primary containment, and systems and components penetrating primary containment does not exceed allowable leakage limits specified in the Technical Specifications. Corrective actions are taken if leakage rates exceed established administrative limits for individual penetrations or the overall containment pressure boundary.

A1.31 MASONRY WALL PROGRAM

The Masonry Wall Program manages cracking of masonry walls, as well as degradation of the structural steel restraint systems of the masonry walls. The Masonry Wall Program, administered as part of the Structures Monitoring Program (A1.32), is based on guidance provided in IE Bulletin 80-11, *Masonry Wall Design* and NRC Information Notice 87-67, *Lessons Learned from Regional Inspections of Licensee Actions in Response to NRC IE Bulletin 80-11*. The Masonry Wall Program contains inspection guidelines and lists attributes that cause aging of masonry walls, which are to be monitored during structural monitoring inspections, as well as establishes examination criteria, evaluation requirements, and acceptance criteria.

A1.32 STRUCTURES MONITORING PROGRAM

The Structures Monitoring Program manages the following aging effects of structures and structural supports in scope of License Renewal:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)

- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of mechanical function
- Loss of sealing
- Reduction of concrete anchor capacity

The Structures Monitoring Program implements the requirements of 10 CFR 50.65, *The Maintenance Rule*, consistent with guidance of NUMARC 93-01, Revision 2 and Regulatory Guide 1.160 Revision 2.

The Structures Monitoring Program provides inspection guidelines for concrete elements, structural steel, roof systems, masonry walls and metal siding, including all masonry walls and water control structures within the scope of license renewal. The Structures Monitoring Program also monitors settlement for each major structure and inspects non-ASME mechanical and electrical supports.

A1.33 RG 1.127, INSPECTION OF WATER-CONTROL STRUCTURES ASSOCIATED WITH NUCLEAR POWER PLANTS

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program manages cracking, loss of bond, loss of material (spalling, scaling), cracking due to expansion, increase in porosity and permeability, loss of strength, and loss of form by performing inspection and surveillance activities for all water control structures associated with emergency cooling water systems. The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is implemented as part of the Structures Monitoring Program. STP is committed to conform to the intent of RG 1.127 with respect to the essential cooling pond (ultimate heat sink). The Structures Monitoring Program includes all water control structures within the scope of RG 1.127, as evaluated in NUREG-1801. The essential cooling pond, the essential cooling pond intake structure, and the essential cooling pond discharge structure are the water-control structures within the scope of license renewal that are monitored by this program. The essential cooling pond (ultimate heat sink) receives periodic monitoring of its hydraulic and structural condition, which includes evaluation of erosion inhibiting structures, conditions of benchmarks and piezometers, and measuring the essential cooling pond volume as indicative of any sediment accumulation. Additionally, STP performs a seepage rate evaluation for the essential cooling pond every five years.

A1.34 NICKEL-ALLOY AGING MANAGEMENT PROGRAM

The Nickel-Alloy Aging Management program manages cracking due to primary water stress corrosion cracking in all plant reactor coolant system pressure boundary locations that contain Alloy 600. Aging management requirements for nickel alloy penetration nozzles welded to the upper reactor vessel closure head are detailed in the STP Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program (A1.5).

The STP Nickel-Alloy Aging Management program uses inspections, mitigation techniques, repair/replace activities, and monitoring of operating experience to manage the aging of Alloy 600 at STP. Detection of indications is accomplished through a variety of examinations consistent with ASME Section XI Subsection IWB, ASME Code Case N-722, and MRP-139 (EPRI Report 1010087) issued under the NEI 03-08 protocol. Mitigation techniques are implemented, when appropriate, to preemptively remove conditions that contribute to primary water stress corrosion cracking. Repair/replacement activities are performed to proactively remove or overlay Alloy 600 material, or as a corrective measure in response to an unacceptable flaw.

A1.35 PWR REACTOR INTERNALS

The PWR Reactor Internals program manages cracking, loss of material, loss of fracture toughness, dimensional changes, and loss of preload for reactor vessel components that provide a core structural support intended function. The program implements the guidance of EPRI 1016596, *PWR Internals Inspection and Evaluation Guideline* (MRP-227, Rev .0) and EPRI 1016609, *Inspection Standard for PWR Internals* (MRP-228). The program manages aging consistent with the inspection guidance for Westinghouse designated primary components in Table 4-3of MRP-227 and Westinghouse designated expansion components in Table 4-6 of MRP-227. The expansion components are specified to expand the primary component sample should the indications of the sample be more severe than anticipated. The aging effects of a third set of MRP-227 internals locations are deemed to be adequately managed by existing program components whose aging is managed consistent with ASME Section XI Table IWB-2500-1, Examination Category B-N-3.

Program examination methods include visual examination (VT-3), enhanced visual examination (EVT-1), volumetric examination, and physical measurements. The program provides both examination acceptance criteria for conditions detected as a result of monitoring the primary components, as well as criteria for expanding examinations to the expansion components when warranted by the level of degradation detected in the primary components. Based on the identified aging effect, and supplemental examinations if required, the disposition process results in an evaluation and determination of whether to accept the condition until the next examination or implement corrective actions. Any detected conditions that do not satisfy the examination acceptance criteria are required to be dispositioned through the corrective action program, which may require repair, replacement, or analytical evaluation for continued service until the next inspection.

The PWR Reactor Internals program is a new program and will be implemented within 24 months after the issuance of EPRI 1016596, *PWR Internals Inspection and Evaluation Guideline* MRP-227-A.

A1.36 ELECTRICAL CABLE CONNECTIONS NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages loosening of bolted external connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation to ensure that electrical cable connections not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended function. As part of the STP predictive maintenance program, infrared thermography testing is being performed on Non-EQ electrical cable connections associated with active and passive components within the scope of license renewal. A representative sample will be tested once prior to the period of extended operation using infrared thermography to confirm that there are no aging effects requiring management during the period of extended operations. The selected sample is based upon application (medium and low voltage), circuit loading (high load), and environment. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that will be implemented prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

A1.37 SELECTIVE LEACHING OF ALUMINUM BRONZE

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching of aluminum bronze (copper alloy with greater than eight percent aluminum) components exposed to treated and raw water within the scope of license renewal. The Selective Leaching of Aluminum Bronze program is an existing program that is implemented by STP procedure. The procedure directs that every six months (not to exceed nine months), an inspection of all aluminum bronze components be completed. In addition, there is a significant amount of buried aluminum bronze piping. The piping is a copper alloy with less than eight percent aluminum content, and is not susceptible to dealloying. However, there are welds in which the filler metal is a copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above aluminum bronze buried piping from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that would indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program. Components with indications of through-wall de-alloying, greater than one inch, will be replaced by the end of the next refueling outage.

The Selective Leaching of Aluminum Bronze program is applied in addition to the Open-Cycle Cooling Water System program (A1.9).

A2 SUMMARY DESCRIPTIONS OF TIME-LIMITED AGING ANALYSIS AGING MANAGEMENT PROGRAMS

A2.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

The Metal Fatigue of Reactor Coolant Pressure Boundary program manages fatigue cracking caused by anticipated cyclic strains in metal components of the reactor coolant pressure boundary. The program ensures that actual plant experience remains bounded by the transients assumed in the design calculations, or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The program tracks the number of transient cycles and cumulative fatigue usage at monitored locations. If a cycle count or cumulative usage factor value increases to a program action limit, corrective actions will be initiated to evaluate the design limits and determine appropriate specific corrective actions. Action limits permit completion of corrective actions before the design basis number of events is exceeded.

A2.2 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRICAL COMPONENTS

The Environmental Qualification (EQ) of Electrical Components program manages component thermal, radiation, and cyclical aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, environmental qualification components not qualified for the current license term are to be refurbished or replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. The program complies with the requirements of 10 CFR 50.49, with exemption and NUREG-0588, *Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment*, is consistent with the guidance of Regulatory Guide 1.89, *Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants*, Revision 0; and conforms to the intent of Regulatory Guide 1.89 Revision 1, including the use of IEEE Standard 323-1974 for demonstrating environmental qualification.

A2.3 CONCRETE CONTAINMENT TENDON PRESTRESS

The Concrete Containment Tendon Prestress program, within the STP ASME Section XI, Subsection IWL program, manages loss of tendon prestress aging effect in the post-tensioning system, and is consistent with requirements of 10 CFR 50.55a (including the 10 CFR 50.55a supplemental requirements). The program includes inspection procedures and acceptance criteria and prescribes specific corrective actions, including increased inspection scope, if inspection criteria are not met.

A3 EVALUATION SUMMARIES OF TIME-LIMITED AGING ANALYSES

10 CFR 54.21(c) requires that an applicant for a renewed license identify time-limited aging analyses (TLAAs) and evaluate them for the period of extended operation. The following TLAAs have been identified and evaluated for STP.

A3.1 REACTOR VESSEL NEUTRON EMBRITTLEMENT

The following calculations of neutron fluence and of its embrittlement effects are TLAAs affected by the extended life of the plant:

- Neutron Fluence Values
- Pressurized Thermal Shock
- Charpy Upper Shelf Energy, C_V USE
- Pressure-Temperature (P-T) Limits
- Low Temperature Overpressure Protection, LTOP

The Reactor Vessel Surveillance program is described in Section A1.15.

A3.1.1 Neutron Fluence Values

Loss of fracture toughness is an aging effect caused by the neutron embrittlement aging mechanism that results from prolonged exposure to neutron radiation. This process results in increased tensile strength and hardness of the material with reduced toughness. As neutron embrittlement progresses, the toughness/temperature curve shifts down (lower fracture toughness as indicated by Charpy upper shelf energy or C_V USE), and the curve shifts to the right (brittle/ductile transition temperature increases). Neutron fluence projections are made in order to estimate the effect on these reactor vessel material properties at end-of-license extended (EOLE). The EOLE is assumed to be 54 effective full power years (EFPY) based on a lifetime capacity factor of 90 percent for 60 years.

The last capsule withdrawn from Unit 1 was Capsule V at the end of cycle (EOC) 11, which yielded a vessel equivalent exposure less than that expected at the EOLE. The last capsule withdrawn from Unit 2 was Capsule U at EOC 9, which yielded a vessel equivalent exposure less than that expected at the EOLE.

The fluence values for EOLE were projected based on the results of the Capsule V and U analyses for Unit 1 and 2, respectively. The revised fluences were determined with transport calculations using the DORT discrete ordinates code and the BUGLE-96 cross-section library which is derived from ENDF/B-VI. The neutron transport and dosimetry evaluation methodologies follow the guidance and meet the requirements of the most recent issue of Regulatory Guide 1.190. The EOLE fluence projections include operation to 54 EFPY, the use of lower-leakage cores, and the uprate.

Fluence will be managed for the period of extended operation by the Reactor Vessel Surveillance program, which is summarized in Section A1.15. The validity of these parameters and the analyses that depend upon them will be managed to the end of the period of extended operation. Therefore, this TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.1.2 Pressurized Thermal Shock

The most recent coupon examination results for both units show that the shift in RT_{NDT} in plate and weld materials are in good agreement with or less than the Regulatory Guide 1.99 Revision 2, predictions for Units 1 and 2. The results demonstrate that Regulatory Guide 1.99 predictions provide a conservative means to satisfy the requirement of 10 CFR 50.61; thus providing assurance of the reactor vessel integrity.

RT_{PTS} values were generated for beltline and extended beltline region materials of the Units 1 and 2 reactor vessels for fluence values at EOLE (54 EFPY). The projected RT_{PTS} values for EOLE meet the 10 CFR 50.61 screening criteria.

The RT_{PTS} values were revised with projections to the end of the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A3.1.3 Upper-Shelf Energy (USE)

The most recent coupon examination results for both units show that the decline in C_V USE in plate and weld materials are less than originally predicted by Regulatory Guide 1.99 Revision 2 for Units 1 and 2. The results demonstrate that the Regulatory Guide 1.99 predictions provide a conservative means to satisfy the requirements of 10 CFR 50, Appendix G; thus providing assurance of the reactor vessel integrity.

To support operation during the period of extended operation, the C_V USE values for Units 1 and 2 were projected to 54 EFPY of operation. The re-evaluations demonstrate that the C_V USE in the limiting material of each unit will remain above the 10 CFR 50 Appendix G acceptance criteria of 50 ft-lbf for the period of extended operation.

The C_V USE values were re-evaluated with projections to the end of the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A3.1.4 Pressure-Temperature (P-T) Limits

Appendix G of 10 CFR 50 requires that reactor vessel boltup, hydrotest, pressure tests, normal operation, and anticipated operational occurrences be accomplished within established pressure-temperature (P-T) limits. These limits are established by calculations that utilize the material properties (adjusted reference temperature, ART), effects of fluence on material properties obtained from the reactor surveillance capsules, and methodology of Appendix G of ASME, Section III.

The current P-T limit curves and the assumed ART value are valid up to 32 EFPY. These STP P-T limits curves are required to be maintained and updated as necessary to maintain plant operation consistent with 10 CFR 50. The P-T limit curves will be managed, as required by the STP license. Therefore, this TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.1.5 Low Temperature Overpressure Protection

Low temperature overpressure protection (LTOP) is required by STP Technical Specification, Limited Condition for Operation (LCO) 3.4.9.3, and is provided by the cold overpressure mitigation system (COMS), which opens the pressurizer power operated relief valves (PORVs) at a setpoint calculated to prevent violation of the pressure-temperature limits. However, these LTOP analyses do not depend on any other time-dependent values beyond the ART at the critical locations and the P-T limits. Changes to the RCS P-T limit curves also require an evaluation of the LTOP temperature and PORV pressure setpoints, and supporting safety analyses.

The COMS setpoints are established in Technical Specification Figure 3.4-4, which will be managed in a manner consistent with the P-T limits. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2 METAL FATIGUE ANALYSIS

This section describes:

- ASME Section III Class 1 Fatigue Analysis of Vessels, Piping, and Components
- ASME Section III Subsection NG Fatigue Analysis of Reactor Pressure Vessel Internals
- Effects of the Reactor Coolant System Environment on Fatigue Life of Piping and Components (Generic Safety Issue 190)
- Assumed Thermal Cycle Count for Allowable Secondary Stress Range Reduction Factor in ANSI B31.1 and ASME Section III Class 2 and 3 Piping
- ASME Section III Fatigue Analysis of Metal Bellows and Expansion Joints

Basis of Fatigue Analysis

ASME III Class 1 design specifications define a set of static and transient load conditions for which components are to be designed. The STP operating licenses are for 40 years. The STP design specifications state that the transient conditions are for a 40 year design life. However, the fatigue analyses are based on a specified number of occurrences of each transient rather than on the design or licensed life. The design number of occurrences of each transient for use in the fatigue analyses was specified to be larger than the number of occurrences expected during the 40 year design life of the plant.

Operating experience at STP and at other similar units has demonstrated that the assumed frequencies of design transients, and therefore, the number of transient cycles assumed for a 40 year life, were conservative; and that with few exceptions the design numbers are not expected to be exceeded during a 60-year life.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section A2.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means.

A3.2.1 ASME Section III Class 1 Fatigue Analysis of Vessels, Piping, and Components

Fatigue analyses are performed for ASME III Division 1 Class 1 vessels, pumps, valves, piping, piping nozzles, and other components subject to fatigue analyses. ASME Section III requires no fatigue analysis for Class 2 components however, the entire pressure boundary of the STP replacement steam generators are constructed in accordance with ASME

Section III requirements. The Class 1 analyses have been updated to incorporate redefinitions of loads and design basis events, operating changes, power uprate, reactor vessel head replacement, and steam generator replacement.

A3.2.1.1 Reactor Pressure Vessel, Nozzles, Head and Studs

The STP Units 1 and 2 reactor pressure vessels (RPVs) are designed to ASME Section III 1971 Edition with addenda through Summer 1973. The STP vessels were built and analyzed for the assumed 40-year number of transient cycles.

Pressure-retaining and support components of the reactor pressure vessel are subject to an ASME Boiler and Pressure Vessel Code Section III fatigue analysis. This analysis has been updated to incorporate redefinitions of loads and design basis events, operating changes, power uprate, replacement steam generators, and minor modifications. The limiting component for fatigue in the reactor pressure vessel pressure boundary and its supports is the control rod drive housing.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section A2.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

The STP Unit 1 and 2 RPV heads were replaced in 2009 and 2010, respectively. The replacement reactor vessel closure heads were designed to ASME Code, Section III, 1989 Edition (no addendum). The fatigue analyses for the heads and any similarly-replaced-and-analyzed appurtenances are analyzed for the design number of transient cycles starting from the time of installation. Therefore, these analyses are TLAAs valid through the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

Unit 1 Reactor Vessel Bottom-Mounted Instrument Nozzle (BMI) Half-Nozzle Repairs

The STP Unit 1 bottom-mounted instrument (BMI) nozzles are Alloy 600, attached to the clad inner surface of the reactor vessel bottom head by Alloy 182 J-groove welds. During Refuel 11 (1RE11, Spring 2003) a boric acid control program inspection discovered leaks at Unit 1 BMI Nozzles 1 and 46. The nozzles were repaired by the “half-nozzle” method. These repairs are the only Alloy 600 half-nozzle repairs at STP.

These repairs were evaluated for growth of postulate residual flaws, fatigue, and corrosion. These analyses qualify the repair for operation from the time of the repair through the period of extended operation, and therefore, are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.2.1.2 Control Rod Drive Mechanism (CRDM) Pressure Housings and Core Exit Thermocouple Nozzle Assemblies (CETNAs)

The STP Unit 1 and 2 control rod drive mechanism (CRDM) pressure housings, the core exit thermocouple nozzle assemblies (CETNAs), and the internal disconnect devices (IDDs) were replaced with the replacement reactor vessel closure heads (RRVCHs). The CRDM pressure housings and CETNAs were designed to the Class 1 requirements of the ASME Code, Section III, 1989 Edition (no addendum)The CRDM pressure housings and CETNAs were designed to the Class 1 requirements of the ASME Code, Section III, 1989 Edition (no addendum). The new CRDMs and CETNAs were qualified for 40 years, which extends the design lives beyond the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.2.1.3 Reactor Coolant Pump Pressure Boundary Components

There are four Model 100 reactor coolant pumps (RCPs) for each reactor. The RCPs for both units were designed to the Class 1 requirements of ASME Section III, 1971, with addenda through the Summer 1973. The design code requires a fatigue analysis per NB-3222.4(e) or a fatigue waiver per NB-3222.4(d). The fatigue and fatigue waiver analyses depend in part on the assumed numbers of design basis normal and upset transient cycles.

Fatigue Waivers

The analyses demonstrated code compliance for most RCP components by satisfying the six criteria for a fatigue waiver. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section A2.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Fatigue Analyses

Components qualified with a fatigue analysis are the RCP casing, thermal barrier flange, cooling coils, seal injection nozzle, and thermal barrier cooling water nozzle with CUFs of 0.4, 0.8287, 0.25, 0.85, and 0.4525, respectively.

The fatigue analyses of the RCP casing, thermal barrier cooling coils, and the thermal barrier water nozzles demonstrate a low CUF based on 40-year design transients. The results extrapolated to 60 years by multiplying the CUFs by 1.5 still satisfy the design requirement of less than 1.0. Therefore, these fatigue analysis are valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

The fatigue analyses for the thermal barrier flange at the holes and seal injection nozzles include step changes in the seal injection water temperature. The transient accounts for switching the charging pump suction from the volume control tank to the refueling water storage tank and back. STP does not operate in this manner and there have been no events of this transient in the history of STP operation. Therefore, the fatigue analyses, which account for this transient, are valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.2.1.4 Pressurizer and Pressurizer Nozzles

The Westinghouse Series 100 pressurizers are vertical cylindrical vessels with hemispherical top and bottom heads, constructed of carbon steel, with austenitic stainless steel cladding on all surfaces exposed to the reactor coolant. The pressurizers and their integral support skirts are Code Class 1, designed to ASME Section III, 1974 Edition.

Pressure-retaining and support components of the pressurizer are subject to an ASME Section III fatigue analysis. This analysis has been revised for plant modifications with redefined loads, and for newly-identified design basis events not included in the original analyses.

The effects of insurge-outsurge transients were evaluated for license renewal. The design transients incorporate heatups and cooldowns which represent pressurizer insurge-outsurge and surge line stratification activity. All components were qualified using the 40-year current licensing basis cycles.

The fatigue analyses of the safety and relief nozzles, and the seismic support lugs demonstrate worst-case 40-year usage factors less than 0.4. When multiplied by 1.5 (60/40) to account for the 60-year period of extended operation, these results do not exceed 0.6, providing a large margin to the code acceptance criterion of 1.0. The analyses of these subcomponents are therefore projected through the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

The fatigue analyses of the remaining subcomponents have been found acceptable for a limiting number of transient events. The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section A2.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.5 Steam Generator ASME Section III Class 1, Class 2 Secondary Side, and Feedwater Nozzle Fatigue Analyses

The Units 1 and 2 steam generators at STP were replaced (in 2000 and 2002, respectively) with Westinghouse Model Delta 94 steam generators and are designed for 40 years of operation (2040 and 2042, respectively), based on design transients. The RSGs are designed and fabricated to the requirements of ASME Boiler and Pressure Vessel Code Section III, 1998 Edition with no Addenda. The primary side of each RSG is ASME Class 1, and the secondary side of each RSG is ASME Class 2. However, the entire pressure boundary of the component is constructed in accordance with ASME Boiler and Pressure Vessel Code Section III Class 1 requirements.

The analyses of the RSGs show that the usage factors of the steam generator components are less than the allowable 1.0, except the manway studs which are qualified by fatigue tests. The fatigue usage factors in the replacement steam generator components do not depend on effects that are time dependent at steady-state conditions, but depend only on effects of operational, abnormal, and upset transient events specified in the design specification.

The Metal Fatigue of Reactor Coolant Pressure Boundary program described in Section A2.1 ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.6 ASME III Class 1 Valves

STP Class 1 valves are designed to ASME III, Subsection NB, 1974 Edition with Summer 1975 addenda (pressurizer safety and control valves) or the 1974 Edition with Winter 1975 addendum (motor-operated, manual valves 3” and larger, and all valves 2” and smaller). ASME Section III requires a fatigue analysis only for Class 1 valves with an inlet piping connection greater than four inches nominal pipe size.

The calculated worst-case usage factors for the following valves indicate that the pressure boundaries would withstand fatigue effects for at least 1.5 times the original design lifetimes:

- 6” pressurizer safety relief valves,
- 6” hi-head safety injection pump discharge check valves,
- 8” hi-head safety injection pump discharge check valves,
- 8” lo-head safety injection to hot leg check valves,
- 12” safety injection to cold leg injection check valves,
- 12” safety injection accumulator outlet valves,
- 2” CVCS auxiliary spray check valves,
- 2” RCP seal injection first check valves, and

- 2” RCP seal injection second check valves.

The design of these valves for fatigue effects is therefore valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

The fatigue usage factors in the RHR pump suction isolation valves do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of operational, abnormal, and upset transient events. Therefore, the increase in operating life to 60 years will not have a significant effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.7 ASME III Class 1 Piping and Piping Nozzles

STP Class 1 reactor coolant main loop piping, surge line piping and other ASME III Class 1 piping is designed to ASME Section III, Subsection NB, 1974 Edition with addenda through Winter 1975. The Class 1 piping fatigue analyses were performed to the ASME III, Subsection NB-3600 and 3200, 1974 Edition with addenda through Winter 1975.

The most limiting calculated design basis usage factors occur in the pressurizer safety lines and approach the limit of 1.0. However, fatigue usage factors in these components do not depend on effects that are time dependent at steady-state conditions, but depend only on effects of normal, upset, and emergency transient events. Therefore, the increase in operating life to 60 years will not have a significant effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.8 Response to Bulletin 88-08: Intermittent Thermal Cycles due to Thermal-Cycle-Driven Interface Valve Leaks and Similar Cyclic Phenomena

NRC Bulletin 88-08 describes the mechanism of thermal cycles in normally-isolated, dead-end branches, due to leaking interface valves. Under these conditions, thermal fatigue of the un-isolable piping can result in crack initiation. Three systems for STP Units 1 and 2 could be subjected to the phenomena described in NRC Bulletin 88-08: normal charging, alternate charging, and auxiliary spray.

The NRC staff safety evaluation of the STP lines concluded that the normal charging, alternate charging, and the auxiliary spray lines at STP are not susceptible to the thermal cycling phenomenon described in NRC Bulletin 88-08.

Evaluations of the charging, alternate charging, and auxiliary spray lines for thermal stratification determined incremental fatigue usage increase of less than 0.001 for the charging and alternate charging lines, and less than 0.03 for of the auxiliary spray lines. These low usage factors demonstrate that this analysis can be projected for the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A3.2.1.9 Response to Bulletin 88-11: Revised Fatigue Analysis of the Pressurizer Surge Line for Thermal Cycling and Stratification

The purpose of NRC Bulletin 88-11 is to request that addressees establish and implement a program to confirm pressurizer surge line integrity in view of the occurrence of thermal stratification and require addressees to inform the staff of the actions taken to resolve this issue.

The surge line was originally designed to ASME Section III, Subsection NB, 1974 Edition with addenda through Winter 1975. The surge line design was reevaluated to the 1986 Code in response to NRC Bulletin 88-11 thermal stratification concerns.

The surge line stratification program for STP Units 1 and 2 performed ASME III stress, fatigue cumulative usage factor, fatigue crack growth, and leak before break analyses. New fatigue usage factors were calculated with thermal transients redefined to account for thermal stratification. The design basis number of cyclic events was unchanged; however a simplified elastic-plastic analysis was performed per NB-3653.6, which resulted in a lower CUF than previous evaluations.

The revised fatigue analyses do not depend on effects that are time-dependent at steady-state operation, but depend only on effects of operational, abnormal, and upset transient conditions. The increase in operating life to 60 years will not have a significant effect on these fatigue analyses so long as the number of cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.10 High Energy Line Break Postulation Based on Fatigue Cumulative Usage Factor

With the exception of the reactor coolant system primary loops, to which a leak-before-break (LBB) analysis applies, breaks in piping with ASME Section III Class 1 fatigue analyses are identified based on a limiting stress criterion; and on a cumulative usage factor criterion. No additional break locations will result from license renewal as long as the current design basis cumulative usage factor analyses remain valid.

Westinghouse justified elimination of break locations in the accumulator safety injection lines and the pressurizer surge line based on increasing the CUF for break consideration from 0.1 to 0.4.

In response to NRC Regulatory Issue Summary (RIS) 2010-07 Westinghouse performed a plant specific evaluation of STP Units 1 and 2 pressurizer surge line analyses for the effects of PWSCC. The evaluation determined that the original analysis conclusions remain valid and the pressurizer surge line pipe breaks should not be considered in the structural basis of STP Units 1 and 2 after weld overlay application.

The NRC also approved the elimination of arbitrary intermediate breaks requiring a commitment by STP to consider fatigue effects in welded integral attachments to Class 2 and 3 piping. STP performed an analysis in accordance with paragraph NC/ND-3645 of the ASME code for five integral pipe supports that were determined to be bounding.

The Class 1 break locations and welded attachments to charging and the main feedwater systems which depend on usage factor will remain valid as long as the numbers of cycles assumed by the analysis are not exceeded. The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The program also ensures that the charging line weld attachments CUF will be below the Code allowable. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

Other than those for the charging system and the main feedwater system, the fatigue analyses for the welded attachments to Class 2 and 3 piping which support the elimination of arbitrary intermediate break locations demonstrate a CUF less than 1.0 during the period of extended operation. Therefore, these TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A3.2.1.11 Fatigue Crack Growth Assessments and Fracture Mechanics Stability Analyses for Leak-Before-Break (LBB) Elimination of Dynamic Effects of Primary Loop Piping Failures

A leak-before-break analysis eliminated the need to postulate longitudinal and circumferential breaks in the reactor coolant system primary loop piping, the pressurizer surge line, and the accumulator line. Elimination of these breaks omitted the need to install pipe whip restraints in the primary loop and eliminated the requirement to design for dynamic (jet and whip) effects of primary loop breaks. The containment pressurization, emergency core cooling system, and environmental qualification large-break design bases were not affected.

The LBB analysis found that fatigue crack growth effects will be negligible. The basis for evaluation of fatigue crack growth effects in the LBB analysis will remain unchanged so long as the number of transient occurrences remains below the number assumed for the analysis of fatigue crack growth effects.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.1.12 Class 1 Design of Class 3 Feedwater Control Valves

The STP feedwater control valves were purchased as ASME III, Class 3 valves. STP UFSAR Table 3.2.B-1 identifies the safety class as non-nuclear safety (NNS). Neither of these classifications indicates a TLAA. However the STP UFSAR associates a limiting number of occurrences of unit loading and unloading at 5 percent full power for these valves, and the methods and acceptance criteria for the evaluation of the valves for these occurrences were based on Class 1 methods of paragraph NB-3545 of ASME III, 1977 Edition through the Winter 1978 Addenda.

The STP units do not operate in a load following mode and therefore the expected number of loading and unloading occurrences is only a small fraction of the design number of occurrences, resulting in a large margin between the analyzed value, 10,300 cycles, and the number projected, 3,366 cycles. Therefore, the fatigue analysis for the STP feedwater control valves is valid for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.2.2 ASME Section III Subsection NG Fatigue Analysis of Reactor Pressure Vessel Internals

The STP reactor vessel internals were designed to meet the intent of the 1974 Edition of Section III of the ASME Boiler and Pressure Vessel Code, Subsection NG, paragraph NG-3311(c); that is, design and construction of core support structures meet Subsection NG in full, and other internals are designed and constructed to ensure that their effects on the core support structures remain within the core support structure limits.

The Subsection NG fatigue usage factors for reactor vessel internals do not depend on effects that are time-dependent at steady-state conditions, but depend only on effects of normal, upset, and emergency transient events. Therefore, the increase in operating life to 60 years will not have an effect on these fatigue usage factors so long as the number of transient cycles remains within the 40-year numbers of cycles assumed by the analysis.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.3 Effects of the Reactor Coolant System Environment on Fatigue Life of Piping and Components (Generic Safety Issue 190)

STP addressed GSI-190 review requirements by assessing the environmental effect on fatigue at the seven sample locations identified by NUREG/CR-6260 for newer vintage Westinghouse Plants.

- Reactor vessel lower head to shell juncture
- Reactor vessel inlet nozzle
- Reactor vessel outlet nozzle
- Surge line hot leg nozzle
- Charging nozzle
- Safety injection nozzle
- Residual heat removal line inlet transition

The Metal Fatigue of Reactor Coolant Pressure Boundary program includes cycle counting of transients affecting all of the NUREG/CR-6260 specified locations. In addition, the Metal Fatigue of Reactor Coolant Pressure Boundary program calculates the usage factors from actual plant transient accumulation in all of the NUREG/CR-6260 locations based on the cycle-based fatigue (CBF) methodology.

The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the fatigue usage factors, including the effects of the reactor coolant environment, remain within the code limit of 1.0 for the period of extended operation; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of the reactor coolant environment on fatigue usage factors in the NUREG/CR-6260 locations will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.2.4 Assumed Thermal Cycle Count for Allowable Secondary Stress Range Reduction Factor in ANSI B31.1 and ASME Section III Class 2 and 3 Piping

STP ASME Section III Class 2 and 3 piping is designed to the 1974 Edition, including Winter 1975 addenda; plus later editions and addenda for certain requirements. STP ANSI B31.1 piping is designed to the 1973 Edition, including Winter 1975 addenda, plus paragraphs from later editions for certain requirements. A review of ASME Section III Class 2 and 3 and B31.1 piping specifications found no indication of a number of expected lifetime full-range or equivalent full-range thermal cycles greater than 7,000 during the original 40-year plant life.

The total count of design basis events significant to fatigue is only about 3,500. The total number of these actually expected in a 60-year life is about 1,040. The total count of expected full-range thermal cycles for most of these systems is less than 1,500 for a 60-year plant life, which is a fraction of the 7,000 cycle threshold for which a stress range reduction factor is required in the applicable piping codes. Therefore, the existing analyses of piping for which the allowable range of secondary stresses depends on the number of assumed thermal cycles and that are within the scope of license renewal are valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.2.5 ASME Section III Fatigue Analysis of Metal Bellows and Expansion Joints

The STP diesel generator cooling water metal expansion joints were designed in accordance with Section ND of the ASME Section III 1977 Code, including Summer 1977 addenda; and have a minimum design life of 40 years. The fatigue analyses for the metal expansion joints verify the 40 year design requirement for the diesel generator cooling water expansion joints by satisfying ASME Section III, Subsection ND-3649.4(d), which limits the component’s lifetime cyclical loading.

The analyzed numbers of cycles for all but seven of the diesel generator cooling water expansion joints are greater than the specified numbers of cycles extrapolated to 60 years. Therefore, the analyses are valid for these bellows through the period of extended operation. These diesel generator cooling water expansion joint TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

STP has committed to replace, prior to the period of extended operation, the seven diesel generator cooling water expansion joints that are projected to exceed the analyzed number of cycles during the period of extended operation. The analyses for the replacement expansion joints will include the period of extended operation. Therefore, these seven diesel generator cooling water expansion joint TLAAs will be dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.3 ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT

10 CFR 50.49 requires that certain electrical and instrument and control (I&C) equipment, important to safety, located in harsh environments, be qualified to perform their safety-related functions in those harsh environments after the effects of in-service aging.

The STP Environmental Qualification program is consistent with the guidance of NUREG-0588, Category I, and the requirements of 10 CFR 50.49, with exemption from the environmental qualification scope for certain low-safety/risk significant (LSS) and non-risk significant (NRS) components. These components remain within the scope of equipment qualification.

The STP Environmental Qualification program outlines the methodology for performing activities required to establish, maintain, and document the environmental qualification of electrical equipment important to safety. The current list of equipment requiring environmental qualification is maintained in accordance with plant procedures and the Equipment Qualification Database. Safety-related electrical equipment and components located in a harsh environment are qualified by test or combination of test and analysis in accordance with the requirements of 10 CFR 50.49 and NUREG-0588, Revision 1. Detailed qualification results for electrical equipment located in a harsh environment are maintained in the station files.

The Environmental Qualification (EQ) of Electric Equipment program, described in Section A2.2, ensures that the aging effects will be managed and that the environmental qualification components continue to perform their intended functions for the period of extended operation. Aging effects addressed by the Environmental Qualification program will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.4 CONCRETE CONTAINMENT TENDON PRESTRESS

The STP containments are prestressed concrete, hemispherical dome on a cylinder structures with a steel membrane liner and a flat basemat. Post-tensioned tendons compress the concrete and permit the structures to withstand design basis accident internal pressures.

The Concrete Containment Tendon Prestress program, described in Section A2.3, periodically measures the prestress load on a defined sample of tendons; and examines the condition of tendons and supporting structures, materials, and components. From the data, the program periodically reconfirms that the expected tendon prestress loads will remain within design limits to at least the next inspection or if the relaxation is not acceptable, prescribes retensioning or other corrective measures to ensure that at no time will the average prestress in a tendon group fall below the minimum required prestress.

In accordance with 10 CFR 50.55a(g)(4)(ii), the third interval inservice inspection program for Subsection IWL will be conducted in accordance with the requirements of the 2004 Edition no addenda of ASME Section XI. The design acceptance criterion is that the measured losses must come close enough to predicted values to provide high confidence that the design value for minimum prestress force will be exceeded throughout the life of the plant. The design acceptance criterion is ensured by surveillance program acceptance criteria that are consistent with ASME XI Subsection IWL-3221.1.

The program inspects a random sample of tendons from each group (vertical and hoop) in each inspection interval to confirm that acceptance criteria are met, and therefore that tendon prestresses remain above minimum required values (MRVs, or minimum required prestress in ASME XI Subsection IWL-3221.1) for the succeeding inspection interval. At each inspection the program also recalculates the regression analysis trend lines of these two groups, based on individual tendon forces, to confirm whether average prestresses will remain above their MRVs for the remainder of the licensed operating period.

The surveillance calculation estimates the 40-year loss and lists the predicted and measured lift-off forces in individual tendons selected for surveillance. Predicted tendon lift-off values are calculated for each individual tendon selected. The measured force trend lines, when projected past 60 years, remain above the minimum required design prestress values. The surveillance data trend line regression analyses are consistent with the methodology presented in NRC Information Notice 99-10, Attachment 3. The calculations of predicted force are consistent with NRC Regulatory Guide 1.35.1.

The recent surveillance data for individual tendons have all fallen above the first action limit at 95 percent of the predicted force line; and the regression analysis of surveillance lift-off data has extended the trend lines for both the vertical and horizontal tendons to 100 years. Both trend lines remain well above their minimum required values for the period of extended operation.

The Concrete Containment Tendon Prestress program, described in Section A2.3, continues to manage loss of tendon prestress for the period of extended operation by confirming that the average lift-off forces of both tendon groups remain above their minimum required values (MRVs), as required by the design basis of the containment building and of its post-tensioning system. Therefore, tendon prestress will be managed for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.5 CONTAINMENT LINER PLATE, METAL CONTAINMENTS, AND PENETRATIONS FATIGUE ANALYSIS

The STP post-tensioned concrete containment vessels are poured against steel membrane liners. No credit is taken for the liner for the pressure design of the containment vessel, but the liner and penetrations ensure the vessel is leak-tight, and its electrical, process, personnel airlock, and equipment hatch penetrations are part of the containment pressure boundary.

The liner specification also states that fatigue will be evaluated per NE-3222.4 and NE-3131(d) of ASME Section III. ASME Section III Division 1, Subsection NE, 1974 and later, Subparagraph NE-3222.4, provides rules for a fatigue analysis of MC components for specified operating conditions involving cyclic application of loads and thermal conditions. NE-3222.4(d) provides rules for waiver of a fatigue analysis.

A3.5.1 Fatigue Waivers for the Personnel Airlocks and Emergency Airlocks

The design of the personnel and emergency airlocks included an ASME Section III NE-3222.4(d) fatigue waiver analysis.

The fatigue waivers remain valid if the number of operating temperature cycles assumed for evaluation are each increased by a factor of 1.5 to account for the period of extended operation. Therefore, the fatigue waiver will remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(ii).

A3.5.2 Fatigue Design of Containment Penetrations

STP evaluated the criteria in ASME III NC-3219.2(a) to determine whether fatigue analyses of penetrations are required. The calculation determined that fatigue analyses are necessary for main steam (M-1 through M-4), feedwater (M-5 through M-8), auxiliary feedwater (M-83, M-84, M-94, and M-95), and steam generator blowdown (M-62 through M-65) penetrations. Further examination of the design reports and calculations for each penetration type identified an additional fatigue analysis of sample line penetrations M-85 and M-86. The penetration fatigue analyses were calculated in accordance with ASME Boiler and Pressure Vessel Code NC-3200.

The fatigue analyses of the containment penetration pressure boundaries are dependent on the assumed 40-year number of transient cycles. The Metal Fatigue of Reactor Coolant Pressure Boundary program, described in Section A2.1, ensures that the numbers of transients actually experienced during the period of extended operation remain below the assumed number; or that appropriate corrective actions maintain the design and licensing basis by other acceptable means. The effects of fatigue will therefore be managed for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

The fuel transfer tube bellows were designed for 1,000 cycles of expansion and contraction. In order to determine if the design analyses remain valid for 60 years of operation, the number of cycles for 60 years has been conservatively projected. For each of these components, one thermal cycle occurs during each refueling operation. The design number of refueling operations is 80 cycles (120 cycles when multiplied by 1.5 for 60 years). In addition to these cycles, the fuel transfer canal penetration assembly is exposed to pressurization cycles during Integrated Leak Rate Tests, conservatively projected to occur once every 5 years. This contributes 12 cycles in 60 years. These penetrations would also be exposed to up to 1 Safe Shutdown Earthquake cycle. Therefore, the total cycles projected for 60 years are a fraction of the design cycles analyzed for these bellows. Therefore, the analyses of all of these penetrations remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.6 PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES

A3.6.1 Load Cycle Limits of Cranes, Lifts, and Fuel Handling Equipment Designed to CMAA-70

The new fuel handling area overhead crane, cask handling overhead area crane, fuel handling building overhead crane, containment polar crane, fuel handling machines, refueling machine, new fuel elevator, and the fuel transfer system will experience only a fraction of their rated lifetime number of lifts over 60 years. Therefore, the designs of these machines remain valid for the period of extended operation. These TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.6.2 In-Service Flaw Growth Analyses that Demonstrate Structural Stability for 40 Years

A search of the CLB did not identify any flaws evaluated which resulted in TLAAs for the remaining life of the plant other than the flaw growth analyses of the half nozzle repair on the Unit 1 bottom mounted instrumentation (BMI) nozzle. As discussed in Section A3.2.1.1 this analyses will remain valid for the period of extended operation and the TLAA was dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A3.6.3 TLAA for the Corrosion Effects in the Essential Cooling Water (ECW) System

In response to NRC Generic Letter 89-13, STP committed to implementation and maintenance of a surveillance and control program to significantly reduce the incidence of flow blockage problems as a result of biofouling. Included in this response is a statement that “Scaling and corrosion inhibitors are also added to the ECW.” This commitment was subsequently revised, and the use of corrosion inhibitors was discontinued at STP, based on the following:

Without the inhibitors, the corrosion rate is 0.6 mil/year compared to less than 0.1 mil/year with the inhibitor. Assuming 40 years of service life, this will not result in corrosion exceeding the design level of 40 mils. This conclusion is based on a 40-year plant life.

Corrosion effects in the essential cooling water system are managed by the Open-Cycle Cooling Water System program discussed in Section A1.9. Therefore, corrosion effects will be managed during the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii).

A3.6.4 Reactor Coolant Pump Flywheel Fatigue Crack Growth Analysis

The aging effect of concern for the reactor coolant pump flywheel is fatigue crack initiation in the flywheel bore keyway. Flywheel inspections are included in the STP In-service Inspection (ISI) Program and are required by STP Technical Specification 4.4.10. To reduce the inspection frequency and scope, STP implemented a Westinghouse Topical Report on Reactor Coolant Pump Motor Flywheel Inspection Elimination, which supports relaxation of inspections required by Regulatory Guide 1.14 Position C.4.b(1) and (2).

The topical report demonstrated that the flywheel design has a high structural reliability with a very high flaw tolerance and negligible flaw crack extension over a 60-year service life (assumed 6000 pump starts). The evaluation is therefore valid for the period of extended operation. This TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i).

A4 LICENSE RENEWAL COMMITMENTS

Table A4-1 identifies proposed actions committed to by STPNOC for STP Units 1 and 2 in its License Renewal Application. These and other actions are proposed regulatory commitments. This list will be revised, as necessary, in subsequent amendments to reflect changes resulting from NRC questions and STPNOC responses. STPNOC will utilize the STP commitment tracking system to track regulatory commitments.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
1	Enhance the Water Chemistry program procedures to: • include a statement that the sampling frequency for the primary and secondary water systems is temporarily increased whenever corrective actions are taken to address an abnormal chemistry condition for action level parameters, and that this increased sampling is utilized to verify that the desired condition has been achieved, and when it is achieved the sampling frequencies are returned to the EPRI recommended frequencies.	B2.1.2	Prior to the period of extended operation
2	Enhance the Boric Acid Corrosion program procedures to: • state that susceptible components adjacent to potential leakage sources include electrical components and connectors. The program will also state that it is applicable to other materials (such as aluminum and copper alloy) that are susceptible to boric acid corrosion.	B2.1.4	Prior to the period of extended operation
3	Enhance the Bolting Integrity program procedures to: • evaluate loss of preload of the joint connection, including bolt stress, gasket stress, flange alignment, and operating condition to determine the corrective actions consistent with EPRI TR-104213.	B2.1.7	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
4	Enhance the Open-Cycle Cooling Water System program procedures to: • include visual inspection of the strainer inlet area and the interior surfaces of the adjacent upstream and downstream piping. Material wastage, dimensional change, discoloration, and discontinuities in surface texture will be identified. These inspections will provide visual evidence of loss of material and fouling in the ECW system and serve as an indicator of the condition of the interior of ECW system piping components otherwise inaccessible for visual inspection. • include the acceptance criteria for this visual inspection.	B2.1.9	Prior to the period of extended operation
5	Enhance the Closed-Cycle Cooling Water System program procedures to: • to include visual inspection of the interior of the piping that is attached to the excess letdown heat exchanger CCW return second check valves. This periodic internal inspection will detect loss of material and fouling and serve as a leading indicator of the condition of the interior of piping components otherwise inaccessible for visual inspection, • include acceptance criteria, and • monitor chemistry parameters consistent with EPRI guideline recommendations for the glycol-based formulations used for the BOP and fire pump diesel jacket water cooling systems.	B2.1.10	Prior to the period of extended operation
6	Enhance the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program procedures to: • inspect crane structural members for loss of material due to corrosion and rail wear.	B2.1.11	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
7	Enhance the Fire Protection program procedures to: • provide visual inspection for corrosion and mechanical damage on halon system components at least once every six months, • provide inspections to detect the following penetration seal deficiencies: signs of degradation such as cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals, • include qualification criteria for individuals performing inspections of fire doors, fire barrier penetration seals, fire barrier walls, ceilings and floors in accordance with NUREG-1801, • include the following fire barrier inspection acceptance criteria: no cracks, spalling, or loss of material that would prevent the barrier from performing its design function, and • provide visual inspection for degradation, corrosion and mechanical damage on Halon system components at least once every six months.	B2.1.12	Prior to the period of extended operation
8	Enhance the Fire Water System program procedures to: • include volumetric examinations or direct measurement on representative locations of the fire water system to determine pipe wall thickness, • replace sprinklers prior to 50 years in service or field service test a representative sample and test every 10 years thereafter to ensure signs of degradation are detected in a timely manner, and • trending of fire water piping flow parameters recorded during fire water flow tests.	B2.1.13	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
9	Enhance the Fuel Oil Chemistry program procedures to: • extend the scope of the program to include the SDG fuel oil drain tanks, • check and remove the accumulated water from the fuel oil drain tanks, day tanks, and storage tanks associated with the SDG, BOP, and fire water pump diesel generators. A minimum frequency of water removal from the fuel oil tanks will be included in the procedure, • include 10-year periodic draining, cleaning, and inspection for corrosion of the SDG fuel oil drain tanks and diesel fire pump fuel oil storage tanks, • inspect the BOP diesel generator fuel oil day tanks for internal corrosion, • require periodic testing of the SDG and diesel fire pump fuel oil storage tanks for microbiological organisms, • require analysis for water, sediment, and particulate contamination of the diesel fire pump fuel oil storage tanks and the BOP diesel generator fuel oil day tanks on a quarterly basis, • conduct ultrasonic testing or pulsed eddy current thickness examination to detect corrosion-related wall thinning once on the tank bottoms for the SDG and diesel fire pump, and the BOP diesel generator fuel oil day tanks, and • incorporate the sampling and testing of the diesel fire pump fuel oil storage tanks for particulate contamination and water and to incorporate the trending of water, particulate contamination, and microbiological activity in the SDG and diesel fire pump fuel oil storage tanks, and the BOP diesel generator fuel oil day tanks.	B2.1.14	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
10	Enhance the Reactor Vessel Surveillance program procedures to: • include the withdrawal schedule and analysis of the ex-vessel dosimetry chain, • demonstrate that the reactor vessel inlet and out nozzles are exposed to a fluence of less than 10^{17} n/cm^2, or will incorporate the adjusted reference temperature (ART) for the inlet and outlet nozzles with bounding chemistry and fluence values into the P-T limit curves, • enhance the program to include the Unit 2 bottom head torus in the Reactor Vessel Surveillance program.	B2.1.15	Prior to the period of extended operation
11	Implement the One-Time Inspection (OTI) program as described in LRA Section B2.1.16.	B2.1.16	During the 10 years prior to the period of extended operation.
12	Implement the Selective Leaching of Materials program as described in LRA Section B2.1.17.	B2.1.17	During the 10 years prior to the period of extended operation.
13	Enhance the Buried Piping and Tanks Inspection program procedures to: • specify the following requirements: Opportunistic inspections are performed whenever pipes or tanks are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.	B2.1.18	Prior to the period of extended operation.
14	Implement the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program as described in LRA Section B2.1.19.	B2.1.19	During the 10 years prior to the period of extended operation.
15	Implement the External Surfaces Monitoring Program as described in LRA Section B2.1.20.	B2.1.20	Prior to the period of extended operation.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
16	Enhance the Flux Thimble Tube Inspection program to generate a new procedure that includes provisions to: • Perform a wall thickness eddy current inspection of all flux thimble tubes that form part of the reactor coolant system pressure boundary. The inspections are scheduled for each outage, and may be deferred by using an evaluation that considers the actual wear rate. • Evaluate flux thimble tube wear by design engineering personnel and perform corrective actions based on evaluation results after each inspection. • Trend wall thickness measurements and calculate wear rates by design engineering personnel after each inspection. • Take corrective actions to reposition, cap or replace the tube, if the predicted wear (as a measure of percent through wall) for a given flux thimble tube is projected to exceed the established acceptance criterion prior to the next outage. • Include a description of the testing and analysis methodology and percent through wall acceptance criteria of a maximum of 80 percent through wall loss. • Remove flux thimbles from service to ensure the integrity of the reactor coolant system pressure boundary for flux thimble tubes that cannot be inspected over the tube length, that are subject to wear due to restriction or other defect, and that can not be shown by analysis to be satisfactory for continued service.	B2.1.21	Prior to the period of extended operation.
17	Implement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program as described in LRA Section B2.1.22.	B2.1.22	Prior to the period of extended operation.
18	Enhance the Lubricating Oil Analysis program procedures to: • require analysis for particle count of the lubricating oil for the centrifugal charging pump, and • require that sample analysis data results, for which no acceptance criteria is specified, be evaluated and trended against baseline data and data from previous samples to determine the acceptability of oil for continued use.	B2.1.23	Prior to the period of extended operation.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
19	Implement the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program as described in LRA Section B2.1.24.	B2.1.24	Prior to the period of extended operation.
20	Enhance the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program procedures to: • identify the cables and manholes that are within the scope of the program, • require that the cable manholes be inspected for water collection based on plant experience. The enhancement requires that the inspection frequencies for all in-scope manholes be at least once every two years. The enhancement requires any manholes containing water be pumped dry, the source of the water is investigated, and the inspection frequency increased based on past experience, • require all in-scope non-EQ inaccessible medium voltage cables exposed to significant moisture simultaneously with significant voltage be tested to provide an indication of the conductor insulation condition, • require that the acceptance criteria be defined prior to each test for the specific type of test performed and the specific cable tested, and • require an engineering evaluation that considers the age and operating environment of the cable be performed when the test acceptance criteria are not met.	B2.1.25	Prior to the period of extended operation
21	Enhance the Metal Enclosed Bus program procedures to: • proceduralize the existing bus inspection activities for inspection and testing of the MEBs to identify license renewal scope, specific bus inspections requirements, and aging effects to be inspected for, frequencies of inspections, acceptance criteria, and actions to be taken when acceptance criteria are not met.	B2.1.26	Prior to the period of extended operation
22	Enhance the ASME Section XI, Subsection IWL program procedures to: • incorporate the 2004 Edition of ASME Section XI, Subsection IWL (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2).	B2.1.28	Prior to the period of extended operation
23	Enhance the ASME Section XI, Subsection IWF program procedures to: • incorporate the 2004 Edition of ASME Section XI, Subsection IWF (with no addenda).	B2.1.29	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
24	Enhance the 10 CFR Part 50 Appendix J program procedures to: • specify a surveillance frequency of 10 years following a successful Type A test.	B2.1.30	Prior to the period of extended operation
25	Enhance the Structures Monitoring Program procedures to: • specify inspections of seismic gaps, caulking and sealants, duct banks and manholes, valve pits and access vaults, doors, electrical conduits, raceways, cable trays, electrical cabinets/enclosures and associated anchorage, • monitor at least two groundwater samples every five years for pH, sulfates, and chloride concentrations, • specify inspection intervals so that all accessible areas of both units are inspected every ten years, and • specify inspector qualifications in accordance with ACI 349.3R-96.	B2.1.32	Prior to the period of extended operation
26	Enhance the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program procedures to: • specify inspections at intervals not to exceed five years or to immediately follow significant natural phenomena.	B2.1.33	Prior to the period of extended operation
27	Implement the PWR Reactor Internals program as described in LRA Section B2.1.35.	B2.1.35	Within 24 months after the issuance of EPRI 1016596, *PWR Internals Inspection and Evaluation Guideline* MRP-227-A
28	Implement the Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program as described in LRA Section B2.1.36.	B2.1.36	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
29	As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into each new program through the STP condition reporting and operating experience programs.	B2.1.16 B2.1.17 B2.1.19 B2.1.20 B2.1.22 B2.1.24 B2.1.35 B2.1.36	Prior to the period of extended operation
30	Enhance the Metal Fatigue of Reactor Coolant Pressure Boundary program procedures to: • include additional locations necessary to ensure accurate calculations of fatigue, • include additional transients that contribute significantly to fatigue usage, • include additional transients necessary to ensure accurate calculations of fatigue, fatigue usage monitoring at specified locations, and specify the frequency and process of periodic reviews of the results of the monitored cycle count and CUF data at least once per fuel cycle, • include additional cycle count and fatigue usage action limits, which will invoke appropriate corrective actions if a component approaches a cycle count action limit or a fatigue usage action limit. The acceptance criteria associated with the NUREG/CR-6260 sample locations for a newer vintage Westinghouse plant will account for environmental effects on fatigue, and • include appropriate corrective actions to be invoked if a component approaches a cycle count action limit or a fatigue usage action limit.	B3.1	Prior to the period of extended operation

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
31	STPNOC will: A. For Reactor Coolant System Nickel-Alloy Pressure Boundary Components: (1) Implement applicable NRC Orders, Bulletins and Generic Letters associated with nickel-alloys; (2) implement staff-accepted industry guidelines, (3) participate in the industry initiatives, such as owners group programs and the EPRI Materials Reliability Program, for managing aging effects associated with nickel-alloys, and (4) upon completion of these programs, but not less than 24 months before entering the period of extended operation, STPNOC will submit an inspection plan for reactor coolant system nickel-alloy pressure boundary components to the NRC for review and approval, and B. For Reactor Vessel Internals: (1) Participate in the industry programs for investigating and managing aging effects on reactor internals; (2) evaluate and implement the results of the industry programs as applicable to the reactor internals; and (3) upon completion of these programs, but not less than 24 months before entering the period of extended operation, STPNOC will submit an inspection plan for reactor internals to the NRC for review and approval.	3.1	Concurrent with industry initiatives and upon completion submit an inspection plan and not less than 24 months before entering the period of extended operation.
32	The seven diesel generator cooling water expansion joints that are projected to exceed the analyzed number of cycles during the period of extended operation will be replaced. The analyses for the replacement expansion joints will include the period of extended operation.	4.3.6	Prior to the period of extended operation
33	Periodic inspection of a sample of transmission conductor connections for loose connections using thermography is currently performed as part of the preventive maintenance activities. The periodic thermography will continue into the period of extended operation.	3.6.2.2.3	Continued into the period of extended operation

APPENDIX B

AGING MANAGEMENT PROGRAMS

B1 APPENDIX B INTRODUCTION

B1.1 OVERVIEW

License renewal aging management program descriptions are provided in this appendix for each program credited for managing aging effects based upon the aging management review results provided in Sections 3.1 through 3.6 of this application. Each aging management program described in this section has 10 elements that are consistent with the definitions in Section A.1, *Aging Management Review - Generic*, Table A.1-1, *Elements of an Aging Management Program for License Renewal*, of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants*. The 10 element detail is only provided when the program is plant-specific.

B1.2 METHOD OF DISCUSSION

For those aging management programs that are consistent with the assumptions made in Sections X and XI of NUREG-1801, or are consistent with exceptions, each program discussion is presented in the following format:

- A program description abstract of the overall program form and function is provided.
- A NUREG-1801 consistency statement is made about the program.
- Exceptions to the NUREG-1801 program are outlined and a justification is provided.
- Enhancements to ensure consistency with NUREG-1801 or additions to the NUREG-1801 program to manage aging for additional components with aging effects not assumed in NUREG-1801 for the NUREG-1801 program. A proposed schedule for completion is discussed.
- Operating experience information specific to the program is provided.
- A conclusion section provides a bases statement of reasonable assurance that the program is effective, or will be effective, once enhanced.

For those programs that are plant-specific, the above form is followed with the additional discussion of all 10 elements.

B1.3 QUALITY ASSURANCE PROGRAM AND ADMINISTRATIVE CONTROLS

The STP Quality Assurance Program implements the requirements of 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants*, and is consistent with the summary provided in Appendix A.2 of NUREG-1800 and the Appendix, Quality Assurance for Aging Management Programs of NUREG-1801. STP has a risk-informed process for categorizing the safety/risk significance of components and has been granted an exemption from the special treatment requirements for components with no risk significance (NRS) or low safety significance (LSS). These no or low significance components are subject to normal industrial and commercial practices. Additionally, nonsafety-related components (and, under certain circumstances, safety-related components) with medium (MSS) or high safety significance (HSS) are evaluated for enhanced treatment. The STP Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls. The STP Quality Assurance Program is applicable to all safety-related systems, structures, and components (SSCs) and nonsafety-related SSCs that are subject to aging management activities. Each of these three elements is applicable as follows:

Corrective Action

STP applies the Station's Corrective Action Program to all safety-related and those nonsafety-related systems, structures, and components requiring aging management, regardless of risk as well as nonsafety-related HSS and MSS SSCs. Corrective action process procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B, *Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants*.

Conditions adverse to quality and significant conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause is determined and that corrective action is taken to preclude repetition through the performance of an apparent or root cause evaluation. The evaluations and implemented corrective actions are documented and reported to appropriate levels of management.

Confirmation Process

The STP Quality Assurance Program requires that measures be taken to preclude repetition of significant conditions adverse to quality. These measures include actions to verify effective implementation of corrective actions.

Plant procedures include provisions for timely evaluation of adverse conditions and implementation of any required corrective actions.

The corrective action process is also monitored for potentially adverse trends. Identification of a potentially adverse trend due to recurring or repetitive unacceptable conditions will result in the initiation of a corrective action document.

Follow-up inspections required by the confirmation process are documented in accordance with the corrective action process. The same 10 CFR 50, Appendix B, corrective actions and confirmation process applies to non-conforming systems, structures, and components subject to aging management review.

Administrative Controls

STP administrative controls require formal procedures and other forms of written instruction for the activities performed under the programs credited for managing aging. These procedures contain objectives, program scope, responsibilities, methods for implementation, and acceptance criteria.

B1.4 OPERATING EXPERIENCE

Operating experience is used at STP to enhance plant programs, prevent repeat events, and prevent events that have occurred at other plants from occurring at STP. External nuclear industry operating experience is screened, evaluated, and acted on to prevent or mitigate the consequences of similar events. External operating experience may include NRC generic communications (e.g., Generic Letters, Bulletins, Information Notices), and other documents (e.g., 10 CFR 21 Reports, Licensee Event Reports, Nonconformance Reports). Internal operating experience may include such things as event investigations, trending reports, lessons learned from in-house events, self-assessments, and the 10 CFR 50, Appendix B, corrective action process.

Each aging management program summary in this appendix contains a discussion of operating experience relevant to the program. This information was obtained through the review of in-house operating experience in the Corrective Action Program, program self-assessments, and program health reports, and the review of industry operating experience focused primarily on post-2005 information (industry operating experience prior to 2005 is addressed in Revision 1 to NUREG-1801). Plant-specific operating experience and applicable industry operating experience was obtained by a review of the STP corrective action program records for the period August 1998 through April 2010 to ensure that there was no unique, plant-specific operating experience in addition to that provided in NUREG-1801. This review was augmented with information from program engineers.

The applicable operating experience for each aging management program was reviewed and summarized in the Appendix B program summaries. Detailed records on the performance and effectiveness of each program are maintained in the STP records management system (including the corrective action program). The operating experience summary in each aging management program identifies past corrective actions and provides objective evidence that the effects of aging have been, and will continue to be, adequately managed so that the intended functions of the structures and components within the scope of each program will be maintained during the period of extended operation.

B1.5 AGING MANAGEMENT PROGRAMS

The following aging management programs are described in the sections listed in this appendix. The programs are either discussed in NUREG-1801 or are plant-specific.

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (Section B2.1.1)
- Water Chemistry (Section B2.1.2)
- Reactor Head Closure Studs (Section B2.1.3)
- Boric Acid Corrosion (Section B2.1.4)
- Nickel-Alloy Penetration Nozzles Welded To The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors (Section B2.1.5)
- Flow-Accelerated Corrosion (Section B2.1.6)
- Bolting Integrity (Section B2.1.7)
- Steam Generator Tube Integrity (Section B2.1.8)
- Open-Cycle Cooling Water System (Section B2.1.9)
- Closed-Cycle Cooling Water System (Section B2.1.10)
- Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems (Section B2.1.11)
- Fire Protection (Section B2.1.12)
- Fire Water System (Section B2.1.13)
- Fuel Oil Chemistry (Section B2.1.14)
- Reactor Vessel Surveillance (Section B2.1.15)
- One-Time Inspection (Section B2.1.16)
- Selective Leaching of Materials (Section B2.1.17)
- Buried Piping and Tanks Inspection (Section B2.1.18)

- One-Time Inspection of ASME Code Class 1 Small-Bore Piping (Section B2.1.19)
- External Surfaces Monitoring Program (Section B2.1.20)
- Flux Thimble Tube Inspection (Section B2.1.21)
- Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (Section B2.1.22)
- Lubricating Oil Analysis (Section B2.1.23)
- Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B2.1.24)
- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B2.1.25)
- Metal Enclosed Bus (Section B2.1.26)
- ASME Section XI, Subsection IWE (Section B2.1.27)
- ASME Section XI, Subsection IWL (Section B2.1.28)
- ASME Section XI, Subsection IWF (Section B2.1.29)
- 10 CFR 50, Appendix J (Section B2.1.30)
- Masonry Wall Program (Section B2.1.31)
- Structures Monitoring Program (Section B2.1.32)
- RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (Section B2.1.33)
- Nickel-Alloy Aging Management Program (Section B2.1.34)
- PWR Reactor Internals (Section B2.1.35)
- Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (Section B2.1.36)
- Selective Leaching of Aluminum Bronze (B2.1.37)

B1.6 TIME-LIMITED AGING ANALYSIS PROGRAMS

The following time-limited aging analysis aging management programs are described in the sections listed in this appendix. These programs are discussed in NUREG-1801.

- Metal Fatigue of Reactor Coolant Pressure Boundary (Section B3.1)
- Environmental Qualification (EQ) of Electrical Components (Section B3.2)
- Concrete Containment Tendon Prestress (B3.3)

B2 AGING MANAGEMENT PROGRAMS

The correlation between NUREG-1801, Generic Aging Lessons Learned programs and STP programs is shown below. For STP programs, links to appropriate sections of this appendix are provided.

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	PLANT PROGRAM	EXISTING OR NEW	APPENDIX B REFERENCE
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Existing	B2.1.1
XI.M2	Water Chemistry	Water Chemistry	Existing	B2.1.2
XI.M3	Reactor Head Closure Studs	Reactor Head Closure Studs	Existing	B2.1.3
XI.M4	BWR Vessel ID Attachment Welds	Not Applicable to a PWR	N/A	N/A
XI.M5	BWR Feedwater Nozzle	Not Applicable to a PWR	N/A	N/A
XI.M6	BWR Control Rod Drive Return Line Nozzle	Not Applicable to a PWR	N/A	N/A
XI.M7	BWR Stress Corrosion Cracking.	Not Applicable to a PWR	N/A	N/A
XI.M8	BWR Penetrations	Not Applicable to a PWR	N/A	N/A
XI.M9	BWR Vessel Internals	Not Applicable to a PWR	N/A	N/A
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion	Existing	B2.1.4
XI.M11A	Nickel-Alloy Penetration Nozzles Welded To The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Nickel-Alloy Penetration Nozzles Welded To The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	Existing	B2.1.5

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	PLANT PROGRAM	EXISTING OR NEW	APPENDIX B REFERENCE
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not Credited	N/A	N/A
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Not Credited	N/A	N/A
XI.M14	Loose Parts Monitoring	Not Credited	N/A	N/A
XI.M15	Neutron Noise Monitoring	Not Credited	N/A	N/A
XI.M16	PWR Vessel Internals	Not Credited	N/A	N/A
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion	Existing	B2.1.6
XI.M18	Bolting Integrity	Bolting Integrity	Existing	B2.1.7
XI.M19	Steam Generator Tube Integrity	Steam Generator Tube Integrity	Existing	B2.1.8
XI.M20	Open-Cycle Cooling Water System	Open-Cycle Cooling Water System	Existing	B2.1.9
XI.M21	Closed-Cycle Cooling Water System	Closed-Cycle Cooling Water System	Existing	B2.1.10
XI.M22	Boraflex Monitoring	Not Applicable to STP	N/A	N/A
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Existing	B2.1.11
XI.M24	Compressed Air Monitoring	Not Credited	N/A	N/A
XI.M25	BWR Reactor Water Cleanup System	Not Applicable for a PWR	N/A	N/A
XI.M26	Fire Protection	Fire Protection	Existing	B2.1.12

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	PLANT PROGRAM	EXISTING OR NEW	APPENDIX B REFERENCE
XI.M27	Fire Water System	Fire Water System	Existing	B2.1.13
XI.M28	Buried Piping and Tanks Surveillance	Not Credited	N/A	N/A
XI.M29	Aboveground Steel Tanks	Not Credited	N/A	N/A
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry	Existing	B2.1.14
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance	Existing	B2.1.15
XI.M32	One-Time Inspection	One-Time Inspection	New	B2.1.16
XI.M33	Selective Leaching of Materials	Selective Leaching of Materials	New	B2.1.17
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection	Existing	B2.1.18
XI.M35	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	New	B2.1.19
XI.M36	External Surfaces Monitoring Program	External Surfaces Monitoring Program	New	B2.1.20
XI.M37	Flux Thimble Tube Inspection	Flux Thimble Tube Inspection	Existing	B2.1.21
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	New	B2.1.22
XI.M39	Lubricating Oil Analysis	Lubricating Oil Analysis	Existing	B2.1.23
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	New	B2.1.24

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	PLANT PROGRAM	EXISTING OR NEW	APPENDIX B REFERENCE
XI.E2	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Not Credited	N/A	N/A
XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Existing	B2.1.25
XI.E4	Metal Enclosed Bus	Metal Enclosed Bus	Existing	B2.1.26
XI.E5	Fuse Holders	Not Credited	N/A	N/A
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	New	B2.1.36
XI.S1	ASME Section XI, Subsection IWE	ASME Section XI, Subsection IWE	Existing	B2.1.27
XI.S2	ASME Section XI, Subsection IWL	ASME Section XI, Subsection IWL	Existing	B2.1.28
XI.S3	ASME Section XI, Subsection IWF	ASME Section XI, Subsection IWF	Existing	B2.1.29
XI.S4	10 CFR Part 50, Appendix J	10 CFR Part 50, Appendix J	Existing	B2.1.30
XI.S5	Masonry Wall Program	Masonry Wall Program	Existing	B2.1.31
XI.S6	Structures Monitoring Program	Structures Monitoring Program	Existing	B2.1.32

NUREG-1801 NUMBER	NUREG-1801 PROGRAM	PLANT PROGRAM	EXISTING OR NEW	APPENDIX B REFERENCE
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Existing	B2.1.33
XI.S.8	Protective Coating Monitoring and Maintenance Program	Not Credited	N/A	N/A
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Metal Fatigue of Reactor Coolant Pressure Boundary	Existing	B3.1
X.E1	Environmental Qualification (EQ) of Electrical Components	Environmental Qualification (EQ) of Electrical Components	Existing	B3.2
X.S1	Concrete Containment Tendon Prestress	Concrete Containment Tendon Prestress	Existing	B3.3
N/A	Plant-Specific	Nickel-Alloy Aging Management Program	Existing	B2.1.34
N/A	Plant-Specific	PWR Reactor Internals	New	B2.1.35
N/A	Plant-Specific	Selective Leaching of Aluminum Bronze	Existing	B2.1.37

B2.1 AGING MANAGEMENT PROGRAM DETAILS

B2.1.1 ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

Program Description

ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program manages cracking, loss of fracture toughness, and loss of material in Class 1, 2, and 3 piping and components within the scope of license renewal. The program includes periodic visual, surface, volumetric examinations and leakage tests of Class 1, 2, and 3 pressure-retaining components, including welds, pump casings, valve bodies, integral attachments, and pressure-retaining bolting. These components are identified in ASME Section XI Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1 for Class 1, 2, and 3 components, respectively. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program has proven within the industry to maintain component structural integrity and ensure that aging effects are discovered and repaired before the loss of component intended function. The STP ISI Program is consistent with ASME Section XI 2004 Edition with no addenda. The STP ISI Program is an existing program that is in accordance with 10 CFR 50.55a. STP will use the ASME Code Edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition of the Code specified twelve months before the start of the inspection interval.

STP is in the third ISI interval which began September 25, 2010 for Unit 1, and October 19, 2010 for Unit 2. The program is being conducted in accordance with ASME Section XI, 2004 Edition which is consistent with provisions in 10 CFR 50.55a to use the ASME Code in effect 12 months prior to the start of the inspection interval. STP is following Inspection Program B as allowed by the ASME Code. Requirements are included for scheduling of examinations and tests for Class 1, 2, and 3 components. The program requires periodic visual, surface, and volumetric examinations and leakage tests of Class 1, 2 and 3 pressure-retaining components. The STP ISI Program provides measures for monitoring to detect aging effects prior to loss of intended function and provides measures for repair and replacement of components with aging effects.

ISI of reactor vessel flange stud holes, closure studs, nuts, and washers are evaluated by Reactor Head Closure Studs program (B2.1.3).

ISI of Class 1, 2, and 3 component supports are evaluated by the ASME Section XI, Subsection IWF program (B2.1.29).

NUREG-1801 Consistency

The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program is an existing program that is consistent with NUREG-1801, Section XI.M1, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

A review of plant-specific operating experience for the STP ISI Program has not revealed any program adequacy issues with the STP ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program.

Review of the Second 10-year ISI Interval Summary Reports for Units 1 and 2 indicates there were six conditions reported during this period. One of the conditions required a replacement. This was an RCP seal housing, which required replacement of the bolts. Two of the other conditions involved bolts which did not need to be repaired or replaced. The three remaining conditions were indications on welds which were evaluated to be acceptable. The Second 10-year ISI Interval Summary Reports did not indicate any implementation issues with the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs. ASME Section XI is revised every three years and addenda issued in the interim, which allows the code to be updated to reflect operating experience. The requirement to update the ISI Program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the ISI Program reflects enhancements due to operating experience that have been incorporated into ASME Section XI.

Conclusion

The continued implementation of the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.2 Water Chemistry

Program Description

The Water Chemistry program manages loss of material, cracking, reduction of heat transfer, and wall thinning in primary and secondary water systems. The scope of the primary water chemistry control program includes monitoring and control of the chemical environment in the reactor coolant system and related auxiliary systems. The scope of the secondary water chemistry control program includes monitoring and control of the chemical environment in the steam generator secondary side and the secondary cycle systems to limit aging effects associated with corrosion mechanisms and stress corrosion cracking. The primary water chemistry control program is consistent with the guidelines of EPRI TR-105714, *PWR Primary Water Chemistry Guidelines*, Volumes 1 and 2, both Revision 6 (issued as TR-1014986), and specific actions for exceeding the technical requirements manual limits of fluorides, chlorides and dissolved oxygen. The secondary water chemistry control program is consistent with EPRI TR-102134, *PWR Secondary Water Chemistry Guidelines*, Revision 7 (issued as TR-1016555).

The water chemistry control strategies are set forth in station strategic plans and these strategies are implemented in station procedures. The programmatic control of the chemical environment ensures that the aging effects due to contaminants are limited. The methods used to manage both the primary and secondary chemical environments rely on the principles of: (1) limiting the concentration of chemical species known to cause corrosion and (2) addition of chemical species known to inhibit degradation by their influence on pH and dissolved oxygen levels. Water chemistry control is effective in areas of intermediate and high flow where thorough mixing takes place and the monitoring samples are representative of actual conditions. The One-Time Inspection program (B2.1.16) is used to verify the effectiveness of the Water Chemistry program in low flow areas.

NUREG-1801 states that the Water Chemistry program is based on guidelines in EPRI report TR-105714, Revision 3, for primary water chemistry, and TR-102134, Revision 3, for secondary water chemistry. STP has adopted EPRI 1014986, Volumes 1 and 2, Revision 6, for primary water chemistry and EPRI 1016555, Revision 7, for secondary water chemistry. The Revision 6 changes to EPRI 1014986 consider the most recent operating experience and laboratory data. These guideline revisions reflect increased emphasis on plant-specific optimization of primary water chemistry to address individual plant circumstances and the impact of the NEI steam generator initiative, NEI 97-06, which require utilities to be consistent with the EPRI Guidelines, and NEI 03-08. EPRI 1002884, Volumes 1 and 2, Revision 5, distinguished between prescriptive requirements and non-prescriptive guidance. Revision 4 of TR-102134 provided an increased depth of detail regarding the corrosion mechanisms affecting steam generators and the balance of plant, and it provided additional guidance on how to integrate these and other concerns into the plant-specific optimization process. Revision 5 of TR-102134 provided additional details regarding plant specific optimization and clarified which portions of the EPRI Guidelines are mandatory under

NEI 97-06. EPRI 1008224, Revision 6, made minor changes including revised action level three requirements, establishing hydrazine action levels and making several control parameter limits more restrictive. Future revisions of the EPRI Primary and Secondary Water Chemistry Guidelines will be adopted as required, commensurate with industry standards.

NUREG-1801 Consistency

The Water Chemistry Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M2, Water Chemistry.

Exceptions to NUREG-1801

None

Enhancements

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

Monitoring and Trending (Element 5), Corrective Action (Element 7), and Confirmation Process (Element 8)

The procedures will be enhanced to include a statement that the sampling frequency for the primary and secondary water systems is temporarily increased whenever corrective actions are taken to address an abnormal chemistry condition for action level parameters, and that this increased sampling is utilized to verify that the desired condition has been achieved, and when it is achieved the sampling frequencies are returned to the EPRI recommended frequencies.

Operating Experience

The Water Chemistry program is based on the guidance contained in EPRI documents TR-105714, Revision 6 and TR-102134, Revision 7, which are based on industry-wide operating experience, research data, and expert opinion. The guidelines are periodically updated and approved by the industry using a consensus process.

STP has experienced out of specification (OOS) occurrences for primary and secondary water chemistry parameters. The OOS occurrences were transients and all of the OOS values were returned to within specification in accordance with the required time intervals. OOS water chemistry events have occurred more often for the secondary systems than for the primary systems.

In 1998, secondary plant sources of copper were documented which led to replacing all feedwater heater and moisture separator reheater (MSR) divider plate aluminum bronze nuts with A453 Grade 660 steel nuts.

Steam generator tube sheet sludge lancing performed in 1RE14 and 2RE13 removed 73 lb and 48 lb, respectively, with very low returns (typically < 10%) from the sludge collector boxes. Such returns represent a small fraction of the iron which is fed to the steam generators. The majority of the iron fed to the steam generators was absorbed into the tube oxide layers.

From general industry experience, condensate and feedwater piping are expected to be an insignificant source for iron transport to the steam generators. However, an EPRI sponsored study at STP in 2000 found it to be a significant source of corrosion iron. Corrosion product transport studies conducted by chemistry have confirmed that condensate and feedwater piping contribute significantly to iron transport values. Iron is at expected levels considering plant design and operational chemistry control.

Conclusion

The continued implementation of the Water Chemistry program, supplemented by the One-Time Inspection program (B2.1.16), provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.3 Reactor Head Closure Studs

Program Description

The Reactor Head Closure Studs program manages cracking and loss of material by conducting ASME Section XI inspections of reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings. The program includes periodic visual, surface, and volumetric examinations of reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings and performs visual inspections of the reactor vessel flange closure during primary system leakage tests. The STP program implements ASME Section XI code, Subsection IWB, 2004 Edition. Reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings are identified in ASME Section XI Tables IWB-2500-1 and are within the scope of license renewal. STP follows the preventive measures in Regulatory Guide 1.65, *Material and Inspection for Reactor Vessel Closure Studs*. STP uses lubricants on reactor head closure stud threads after reactor head closure stud, nut, and washer cleaning and examinations are complete. The lubricants are compatible with the stud material and operating environment and do not include MoS_2 which is a potential contributor to stress corrosion cracking.

In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition of the Code specified twelve months before the start of the inspection interval. STP will use the ASME Code Edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

Potential cracking and loss of material conditions in reactor vessel flange stud hole threads, reactor head closure studs, nuts, washers, and bushings are detected through visual, surface, or volumetric examinations in accordance with ASME Section XI requirements in STP procedures every ten years. These inspections are conducted during refueling outages. Reactor vessel studs are removed from the reactor vessel flange each refueling outage. Studs, nuts, washers, and bushings are stored in protective racks after removal. Reactor vessel flange holes are plugged with water tight plugs during cavity flooding. These methods assure the holes, studs, nuts, washers, and bushings are protected from borated water during cavity flooding. Reactor vessel flange leakage is detected prior to reactor startup during reactor coolant system pressure testing each refueling outage. The STP program has proven to be effective in preventing and detecting potential aging effects of reactor vessel flange stud hole threads, closure studs, nuts, washers, and bushings.

NUREG-1801 Consistency

The Reactor Head Closure Studs program is an existing program that is consistent, with exception to NUREG-1801, Section XI.M3, Reactor Head Closure Studs.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1)

Regulatory Guide 1.65 states that the ultimate tensile strength of stud bolting material should not exceed 170 ksi. One closure head insert has a tensile strength of 174.5 ksi. STP credits inservice inspections that are within the scope of this AMP, which are implemented in accordance with the STP Inservice Inspection Program, Examination Category B-G-1 requirements, as the basis for managing cracking in these components. This is in accordance with the “parameters monitored or inspected” and “detection of aging effects” program elements in NUREG 1801, Section XI.M3. In addition, the studs, nuts and washers are coated with a lubricant which is compatible with the stud materials, and the studs, nuts, and washers are protected from exposure to boric acid by removing them and plugging the reactor vessel flange holes during cavity flooding.

Corrective Actions (Element 7)

NUREG-1801, Section XI.M3 specifies the use of Regulatory Guide 1.65 requirements for closure stud and nut material. STP uses SA-540, Grade B-24 (as modified by Code Case 1605) stud material. The use of this material has been found acceptable to the NRC for this application within the limitations discussed in Regulatory Guide 1.85, *Materials Code Case Acceptability.*

Enhancements

None

Operating Experience

Review of plant-specific operating experience has not revealed any program adequacy issues with the Reactor Head Closure Studs program for reactor vessel closure studs, nuts, washers, bushings, and flange thread holes. No cases of cracking due to SCC or IGSCC have been identified with STP reactor vessel studs, nuts, washers, bushings, and flange stud holes.

Review of the Refueling Outage Inservice Inspection Summary Reports for Interval 2 indicates there were no repair/replacement items identified with reactor vessel closure studs, nuts, washers, bushings, or flange thread holes. None of the repair/replacement items indicate any implementation issues with the STP ASME Section XI Program for reactor closure studs, nuts, washers, bushings, or flange thread holes.

The ISI Program at STP is updated to account for industry operating experience. ASME Section XI is also revised every three years and addenda issued in the interim, which allows the code to be updated to reflect operating experience. The requirement to update the ISI Program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the ISI Program reflects enhancements due to operating experience that have been incorporated into ASME Section XI.

Conclusion

The continued implementation of the Reactor Head Closure Studs program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.4 Boric Acid Corrosion

Program Description

The Boric Acid Corrosion program manages loss of material and corrosion of connector contact surfaces due to boric acid leakage. The program monitors mechanical, electrical, and structural components within the scope of license renewal that are susceptible to boric acid corrosion from systems that contain reactor coolant or treated borated water. The principal industry guidance document used is WCAP-15988-NP, *Generic Guidance for an effective Boric Acid Inspection Program for Pressurized Water Reactors*. The program relies in part on implementation of recommendations of NRC Generic Letter 88-05, *Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants*. Additionally, the program includes examinations conducted during ISI pressure tests performed in accordance with ASME Section XI requirements. The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program (B2.1.5) and the Nickel-Alloy Aging Management Program (B2.1.34) as well as the Boric Acid Corrosion control program, implement inspections of reactor coolant pressure boundary components to identify degradation.

The Boric Acid Corrosion program includes provisions to identify leakage, inspect and examine for evidence of leakage, evaluate leakage, and initiate corrective actions. The program maintains a tracking and trending program for boric acid leakage from plant components and establishment of a component-based visual history of boric acid leakage/seepage. Long-term corrective actions to control boric acid leakage, to impede boric acid leakage, to impede boric acid attack, and to prevent recurrence of previous problems may include the use of suitable materials, protective coatings and claddings, and increased RCS leakage monitoring, as appropriate.

NUREG-1801 Consistency

The Boric Acid Corrosion program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M10, Boric Acid Corrosion.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1)

Procedures will be enhanced to state that susceptible components adjacent to potential leakage sources include electrical components and connectors. The program will also state that it is applicable to other materials (such as aluminum and copper alloy) that are susceptible to boric acid corrosion.

Operating Experience

The Condition Reporting program, industry operating experience, and STP self assessments provide input to ensure that the Boric Acid Corrosion program is maintained at a highly effective level.

Following the Davis-Besse event, the STP Boric Acid Corrosion program was improved through Order EA-03-009, the NRC Order Establishing Interim Inspection Requirements For Reactor Pressure Vessel Heads. In response to NRC generic communications, the reactor coolant system pressure boundary integrity walkdowns were revised to perform periodic visual inspection of the reactor coolant system components and surrounding equipment, documenting any indication of leakage. In 2006, on Unit 1, volumetric examinations were performed on all 76 reactor head penetration tubes with J-groove welds, including the head vent penetration and the degas penetration. The examination detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified. In addition, a visual inspection to identify potential boric acid leaks from the pressure-retaining components above the reactor pressure vessel head found no indications.

In March of 2004, a coolant leak was detected at reactor coolant pump 2C. Borated water solution traveled to the shanks of all the seal housing bolts, which were constructed of low alloy steel. All of the bolts experienced some degradation, with 15 of the 16 failing VT-1 inspection for continued service. Taking into consideration the worst case pitting, none of the bolts experienced a reduction of more than 10 percent. The degraded bolting was replaced. The leakage was attributed to seal housing bolting relaxation. The leaking seal was replaced and inspected in 2004. A preventative maintenance activity was created to periodically measure for, and adjust as necessary, for bolt elongation in the 4 RCP seal housings. Leakage on RCP 2C recurred in September 2009 and all seal housing bolts were again replaced. Pump disassembly for surface profilimitry (flatness checks) are scheduled for 2RE15, October 2011.

In 2007, on Unit 2, a BMV inspection found no relevant indications. No evidence of cracks, leakage, or wastage was found. A volumetric inspection performed on all 76 reactor head penetration tubes with J-groove welds, including the head vent penetration and the de-gas penetration detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified. During an inspection of the pressure-retaining components above the RPV head, a small active leak was identified on an active control rod drive mechanism, penetration number 35. A light film of boric acid residue was observed on the penetration at the insulation interface. The BMV inspection of the RPV head confirmed that the leak deposited no boric acid residue on the RPV head or into the RPV head penetration annulus. . Based on an evaluation of previous similar leakage experiences in both Unit 1 and 2, the apparent cause of the canopy seal weld leakage was transgranular stress corrosion cracking. The leakage was corrected by installing a canopy seal clamp assembly until the head was replaced in 1RE15, October 2009. No further evidence of leakage was identified prior to head replacement.

In March of 2008, a Boric Acid Corrosion program walkdown was completed. Leakage was identified from the reactor vessel inner O-ring leakoff line, emanating from a pipe-to-tube adapter to a flex hose. Moderate boron accumulation was observed and a Condition Report was created to decontaminate, evaluate susceptible components, and make any necessary repairs. Four valves were found to have packing leaks. No structural damage of susceptible materials was found or expected to occur. The inspection found no leakage that affected the primary pressure boundary structural integrity. No corrosion of susceptible material in the scope of this inspection was observed.

A review of the operating experience shows that both active boric acid leakage and crystal buildup have been identified, evaluated and the resulting component damage has been repaired. This Boric Acid Corrosion program operating experience provides objective evidence to support the conclusion that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Boric Acid Corrosion program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.5 Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors

Program Description

The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program manages cracking due to primary water stress corrosion in nickel-alloy vessel head penetration nozzles and associated welds as well as loss of material in the reactor vessel closure head. This program was developed in response to NRC Order EA-03-009. ASME Code Case N-729-1, subject to the conditions specified in 10 CFR 50.55 a(g)(6)(ii), has superseded NRC Order EA-03-009.

Detection of cracking is accomplished through implementation of a combination of bare metal visual examination (external surface of head) and surface and volumetric examination (underside of head) techniques. The STP ISI Program has been enhanced to incorporate the governing inspections required by ASME Code Case N-729-1. A plant procedure conducts Reactor Pressure Vessel (RPV) head bare metal visual inspections consistent with ASME Code Case N-729-1. Visual examiners are required to have VE certification, VT-2 plus four hours of boric acid training. Personnel performing the final evaluation of bare metal head examination data are required to be Level II, VT-2 plus four hours of boric acid training, or higher.

The Unit 1 RPV head was replaced during 1RE15 (October 2009). The Unit 2 RPV head was replaced during 2RE14 (April 2010). All components penetrating the new reactor vessel closure heads and welded to the inner surfaces of the reactor vessel closure heads have been fabricated and welded using PWSCC resistant materials.

NUREG-1801 Consistency

The Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program is an existing program that is consistent with NUREG-1801, Section XI.M11A, Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The RPV heads were replaced during 1RE15 (October 2009) and 2RE14 (April 2010). All components penetrating the new heads have been fabricated and welded using PWSCC resistant materials. As applicable plant-specific operating experience becomes available, it will be evaluated and appropriately incorporated into the program through the STP Corrective Action and Operating Experience programs.

Conclusion

The continued implementation of the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.6 Flow-Accelerated Corrosion

Program Description

The Flow-Accelerated Corrosion (FAC) program manages wall thinning due to flow-accelerated corrosion on the internal surfaces of carbon or low alloy steel piping and system components which contain high energy fluids (both single phase and two phase). The program implements the EPRI guidelines in NSAC-202L-R3 to detect, measure, monitor, predict and mitigate component wall thinning. To aid in the planning of inspections and choosing inspection locations, STP utilizes the EPRI predictive computer program CHECWORKS that uses the implementation guidance of NSAC-202L-R3.

The objectives of the FAC program at STP are achieved by (a) identifying system components susceptible to FAC, (b) performing analyses using the predictive code CHECWORKS to determine critical locations for inspection and evaluation, (c) providing guidance for follow-up inspections, (d) repairing, replacing, or performing evaluations for components not acceptable for continued service, based on the wear rates and minimum acceptable design thickness, and (e) evaluating and incorporating the latest technologies, industry and plant in-house operating experience.

Procedures and methods used by the FAC program are consistent with STP commitments to NRC Bulletin 87-01, *Thinning of Pipe Wall in Nuclear Power Plants*, and NRC Generic Letter 89-08, *Erosion/Corrosion-Induced Pipe Wall Thinning*.

NUREG-1801 Consistency

The Flow-Accelerated Corrosion program is an existing program that is consistent, with exception, to NUREG-1801, Section XI.M17, Flow-Accelerated Corrosion.

Exceptions to NUREG-1801

Scope of Program (Element 1) and Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M17 indicates the Flow-Accelerated Corrosion program relies on implementation of EPRI guidelines in NSAC-202L-R2. However, STP uses the recommendations provided in the EPRI Guideline NSAC-202L-R3. The new revision of EPRI guidelines incorporates lessons learned and improvements to detection, modeling, and mitigation technologies that became available since Revision 2 was published. The updated recommendations are intended to refine and enhance those of previous revisions without contradictions to ensure continuity of existing plant FAC programs

Enhancements

None

Operating Experience

Review of work orders from 1998 through present showed that there has been no reported FAC-related leak or rupture at STP for the components within the scope of license renewal. Most of the work orders identified the effect of wall thinning during the FAC program inspections. There were cases where the allowable thickness determined in accordance with the program guidelines was reached and more rigorous stress analyses were performed to justify continued service and to postpone the replacement. Problems identified during implementation of the program activities were not significant to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. Industry and plant operating experience have been reviewed for applicability and adjustments have been made to outage inspection lists in accordance with program guidelines.

For refueling outages 1RE12 through 1RE14 (April 2008) and 2RE10 through 2RE12, 102 to 112 locations of large-bore systems were selected for inspection before the outage. The scope was expanded when necessary based on UT findings. An inspection location included the subject component (such as an elbow) and its adjacent area (such as upstream and downstream piping). For small-bore systems, 28 to 54 inspections were selected before the outage for RT inspections. The scope was also expanded when necessary based on RT findings. Scheduling of piping replacements for each outage takes into consideration 1) the projected remaining service life of the pipe based on FAC analysis; 2) industry experience of wall thinning for the pipe and its operating environment; and 3) cost of replacement compared to the cost of performing future inspections. The selections of FAC-resistant materials were stainless steel or chrome-moly alloy. Baseline inspections were performed for selected replacement locations of chrome-moly alloy.

Conclusion

The continued implementation of the Flow-Accelerated Corrosion program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.7 Bolting Integrity

Program Description

The Bolting Integrity program manages cracking, loss of material, and loss of preload for pressure retaining bolting and ASME component support bolting. The program includes preload control, selection of bolting material, use of lubricants/sealants consistent with EPRI NP-5067 *Good Bolting Practices*, and performance of periodic inspections for indication of aging effects. The program also includes inservice inspection requirements established in accordance with ASME Section XI, Subsections IWB, IWC, IWD, and IWF for ASME Class bolting.

STP good bolting practices are established in accordance with plant procedures. These procedures include requirements for proper disassembling, inspecting, and assembling of connections with threaded fasteners. In addition to the inspection activities noted above, the Bolting Integrity program includes activities for preload control, material selection and control, and use of lubricants/sealants. The general practices that are established in this program are consistent with EPRI NP-5769, *Degradation and Failure of Bolting in Nuclear Power Plants*, Volumes 1 and 2, and the recommendations delineated in NUREG-1339.

Following the review of the recommendations provided in NRC Generic Letter 91-17, NUREG-1339 and the EPRI reports, NP-5769 and NP-5067, STP had identified and implemented the action items related to bolting degradation or failure. The guidance provided in EPRI NP-5067 and NUREG-1339, together with other industrial experience regarding bolting issues was consolidated in EPRI TR-104213, *Bolted Joint Maintenance and Applications Guide*. Although the procedures for ensuring bolting integrity do not directly reference EPRI TR-104213, they do reference EPRI NP-5769, EPRI-5067 and NUREG-1339. Implementation of the recommendations in EPRI NP-5067, EPRI NP-5769 and NUREG-1339 is considered to be consistent with the recommendations in EPRI TR-104213.

The following STP aging management programs supplement the Bolting Integrity program with management of loss of preload, cracking, and loss of material:

(a) ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD (B2.1.1) provides the requirements for inservice inspection of ASME Class 1, 2, and 3 safety-related pressure retaining bolting.

(b) ASME Section XI, Subsection IWF (B2.1.29) provides the requirements for inservice inspection of safety-related component support bolting.

(c) External Surfaces Monitoring Program (B2.1.20) provides the requirements for inspection of pressure boundary closure bolting within the scope of license renewal.

(d) Structures Monitoring Program (B2.1.32) provides the requirements for inspection of structural bolting.

NUREG-1801 Consistency

The Bolting Integrity program is an existing program, that following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M18, Bolting Integrity.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1)

NUREG-1801 references EPRI TR-104213 as the industry's technical basis for the program associated with nonsafety-related bolting. The bolted joint procedure for ensuring bolting integrity identifies preload requirements and general practices for in scope bolting but does not directly reference EPRI TR-104213 as an applicable source document for these recommendations. However, this procedure does reference and incorporate the good bolting practices identified in EPRI NP-5067, ERPI 5769 and NUREG-1339. EPRI NP-5769 is very closely related with EPRI TR-104213. Implementation of the recommendations in EPRI NP-5067 and EPRI NP-5769 and NUREG-1339 is considered to be consistent with the recommendations in EPRI TR-104213 to meet NUREG-1801 requirements.

Parameters Monitored or Inspected (Element 3)

NUREG-1801 states that bolting for safety-related pressure retaining components is inspected for loss of preload/loss of prestress. Loss of preload is not a parameter of inspection for the STP Bolting Integrity program. AT STP the application of good bolting techniques provided in plant procedures and vendor instructions during assembly of bolted joints minimizes the possibility for a loss of preload/loss of prestress. The discussion of bolt preload in EPRI NP-5769, Vol. 2, Section 10, indicates that job inspection torque is non-conservative since for a given fastener tension more torque is required to restart the installed bolts. The techniques for measuring the amount of bolt tension in an assembled joint are both difficult and unreliable. Inspection of preload is usually unnecessary if the installation method has been carefully followed. Torque values are provided in plant procedure if not provided by the vendor instructions, design documents or specifications. These torque values are based on the industrial experience that includes the consideration of the expected relaxation of the fasteners over the life of the joint and gasket stress in the application of pressure closure bolting. Additionally visual inspections for leakage would detect a loss of preload/loss of prestress in the connection prior to a loss of intended function.

Monitoring and Trending (Element 5)

NUREG-1801, Section XI.M18 specifies that if bolting connections for pressure retaining components (not covered by ASME Section XI) are reported to be leaking, then they may be inspected daily. If the leak rate does not increase, the inspection frequency may be decreased to biweekly or weekly. STP procedures require the inspection frequency be adjusted as necessary based on the trending of inspection results to ensure there is not a loss of intended function between inspection intervals. For pressure retaining components reported to be leaking, STP procedures initiate the site corrective action process. Consideration is also given to adequate frequency of subsequent inspections to ensure the inspection interval is adequate to detect further aging degradation so that a loss of intended function is avoided.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

Corrective Actions (Element 7)

Procedures will be enhanced to evaluate loss of preload of the joint connection, including bolt stress, gasket stress, flange alignment, and operating condition to determine the corrective actions consistent with EPRI TR-104213.

Operating Experience

Both the industry and NRC have revealed a number of instances of bolting concerns from material control and certification (e.g. NRC Bulletin 87-02) to bolting practices, use of lubrication and injection sealants and its effect on SCC (e.g., NRC Bulletin 82-02, and INPO SOER 84-05). The Bolting Integrity program incorporates the applicable industry experience on bolting issues into the program. Actions taken include confirmatory testing/analysis or inspections. Also included are the addition of procedures of inspection, material procurement and verification processes. NRC Information Notices, Bulletins, Circulars, and Generic Letters listed in Section 3 of NUREG-1339 were evaluated for applicability to the STP Bolting Integrity program to ensure conformance with the recommendations of NUREG-1339.

There is no reported case of cracking of bolting due to stress corrosion cracking.

A review of operating experience contained in STP condition reports (CRs) were evaluated for aging effects associated with the Bolting Integrity program. Of these CRs only 19 were determined to have applicable aging effects associated with the Bolting Integrity program. The following is a summary of the aging effects reported in these CRs.

Condensation has been observed to cause surface corrosion of bolting associated with chilled water bolted connections. The instances were evaluated and it was determined that the corrosion was limited to the surface and did not affect the integrity of the bolted joint. To prevent this corrosion from reoccurring the bolting was either painted to prevent water droplets coming in direct contact with carbon steel bolting or insulation was installed to prevent the cool surface temperatures from creating the condensation.

Leakage from fittings and pump mechanical seals has also caused corrosion of bolting when the leaking system fluid came in contact with bolting. The bolting was evaluated for each joint and replaced where required.

Boric acid accumulations have been observed on bolting. After the boric acid accumulations were removed the bolting was evaluated. The bolting was determined to be acceptable as found or replaced if the bolting material was degraded by boric acid corrosion.

Incorrect materials have been found in bolting connections during system walkdowns and inspections. The bolting was replaced with the correct material.

Conclusion

The continued implementation of the Bolting Integrity program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.8 Steam Generator Tube Integrity

Program Description

The Steam Generator Tube Integrity program manages the loss of material of the following component types: steam generator tubes, tube support plates, secondary side access covers, secondary nozzles, moisture separators, internal structures, flow distribution baffles, feedwater rings, auxiliary feedwater (AFW) spray pipes, primary head and divider plates. The program manages the cracking of the following component types: steam generator tubes, plugs, tube support plates, secondary side access covers, secondary nozzles, primary head and divider plates, internal structures, flow distribution baffles, feedwater rings, and AFW spray pipes. The program also manages wall thinning of the following component types: moisture separators, feedwater rings, and AFW spray pipes. The program ensures the integrity of the primary to secondary pressure boundary through assessments of potential degradation mechanisms, inspections, tube integrity assessments, maintenance plugging and repairs, primary to secondary leakage monitoring, maintenance of the secondary-side integrity, primary side and secondary side water chemistry, and foreign material exclusion. STP procedural guidance ensures performance criteria for tube structural integrity, operational leakage and accident induced leakage. Reporting criteria, inspection scope and frequency, assessments, plugging criteria, and primary to secondary leak rate monitoring, monitoring and controlling primary and secondary side water chemistry are consistent with the requirements of STP Units 1 and 2 Technical Specifications, the Maintenance Rule (10 CFR 50.65) and NEI 97-06, *Steam Generator Program Guidelines,* Revision 2. Tube structural integrity limits consistent with Regulatory Guide 1.121, *Bases for Plugging Degraded PWR Steam Generator Tubes* are applied as detailed in UFSAR Section 3.12.1.

The training and qualification standards for personnel engaged in the acquisition and/or evaluation of steam generator non-destructive examination (NDE) activities are specified in a station administrative procedure, and inspection practices are consistent with the EPRI PWR Steam Generator Examination Guidelines. STP programmatic guidance also requires that each inspection be based on a degradation assessment created for each refueling outage that considers existing and potential degradation mechanisms.

The STP steam generators were replaced with Westinghouse Delta 94 Steam Generators in 2000 and 2002 for Units 1 and 2, respectively. The STP replacement steam generators are equipped with Alloy 690TT tubes. The tube support plates are fabricated from type 405 stainless steel and the tube holes are trefoil-broached. Due to the advanced design and features, and material selection of the replacement steam generators, the previously significant degradation mechanisms of tube support plate erosion/corrosion and corrosion-induced denting, divider plate cracking, and wrapper drop have insignificant potential of occurring. Since the STP replacement steam generators are not susceptible to the modes of degradation defined in Generic Letter 97-06, the STP response to NRC Generic Letter 97-06 is no longer applicable. Anti-vibration bar (AVB) wear in the STP steam generators is unlikely, since the STP replacement steam generators have a U-bend region designed to prevent the potential mechanical wear seen in the first generation steam generators.

NUREG-1801 Consistency

The Steam Generator Tube Integrity program is an existing program that is consistent with NUREG-1801, Section XI.M19, Steam Generator Tube Integrity.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Degradation Assessment for STP examines industry experience for Westinghouse advanced-design steam generators to determine the potential degradation mechanisms for STP steam generators. To date, the dominant degradation mechanism detected in U.S. replacement steam generators equipped with Alloy 690TT tubing has been mechanical wear, primarily from foreign objects and a few cases of anti-vibration bar (AVB) wear.

Based on industry operating experience and the loose parts wear experienced in STP steam generator 1D, tube wear at AVB intersections and loose parts wear are considered potential degradation mechanisms. Other degradation mechanisms have a very low likelihood of occurrence. STP has experienced chemistry events with chloride, hydrazine and sodium, where inspected parameters have been found at concentrations outside the specified operating range. All conditions were evaluated and corrective actions were instituted, when appropriate, to prevent reoccurrence.

Pre-service Non-Destructive Examination inspections of the new STP steam generators were performed at the manufacturing site. These included 100 percent full length bobbin coil examinations, and additional tests on select areas of interest. As a result of this preservice inspection, a total of six tubes in the Unit 2 steam generators and 108 tubes in the Unit 1 steam generators were plugged. There are 7585 tubes in each of the four steam generators at STP. Unit 1 SG B had the most tubes plugged (40) as a result of this pre-service inspection. This pre-service inspection also established the baseline for future eddy current testing of the STP steam generators.

Unit 1 steam generators were replaced in 1RE09 (March 2000). Unit 1 refueling outage 1RE11 occurred in April of 2003. In Unit 1, during operating cycle 11, a feed water heater event released foreign materials into steam generator 1D. Four tubes in the steam generator 1D cold leg were identified with wear due to wire from the feedwater heater event of operating cycle 11. One tube required plugging due to a wear depth of 44 percent and the remaining tubes had wear depths of less than 20 percent and remained in service. Two tubes with volumetric indications greater than 20 percent were plugged. The Condition Monitoring limits were met and an Operation Assessment showed no challenge to tube integrity for the next cycle for steam generator 1D. Steam generators 1A/B/C were approved for the next 3 cycles of operation.

During 1RE14 (April 2008), 220 foreign objects from the feedwater event of operating cycle 11 were identified during the secondary side visual inspections. No wear was found due to the stabilizer wire that was the most common of the foreign objects. Foreign object retrieval removed 150 of the foreign objects during the 1RE14 (April 2008) outage. For the items remaining, an engineering evaluation supported by detailed wear calculations provided the conclusion that no tube in steam generator 1D would experience wear exceeding the plugging limit during the next two cycles of operation. Additional detailed wear calculations will be required before operation beyond the next two cycles and are included in the SG Degradation Assessment.

Based on a review of operating experience, degradation has been consistent with industry experience, including the operating experience identified in NUREG-1801. STP has effectively monitored and trended abnormal conditions. Appropriate corrective actions have been taken, including increasing sampling frequencies, physical inspections, and repair. As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the Condition Reporting Process or the Operating Experience program.

Conclusion

The continued implementation of the Steam Generator Tube Integrity program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.9 Open-Cycle Cooling Water System

Program Description

The Open-Cycle Cooling Water (OCCW) System program manages cracking, loss of material, and reduction of heat transfer for components in scope of license renewal and exposed to the raw water of the essential cooling water (ECW) and essential cooling water screen wash system. The program includes surveillance techniques and control techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures and silting in components of the ECW system, and structures and components serviced by the ECW system, that are in scope of license renewal. The program also includes periodic inspections to monitor aging effects on the OCCW structures, systems and components, component cooling water heat exchanger performance testing, and inspections of the other safety related heat exchangers cooled by the ECW System, to ensure that the effects of aging on OCCW components are adequately managed for the period of extended operation. Components within the scope of the OCCW System program are: 1) components of the ECW system that are in scope of license renewal and 2) the safety-related heat exchangers cooled by the ECW system: component cooling water heat exchangers, diesel generator jacket water heat exchangers, diesel generator lube oil coolers, diesel generator intercoolers, essential chiller condensers, and component cooling water pump supplementary coolers. The program is consistent with STPNOC commitments established in responses to NRC Generic Letter 89-13, *Service Water System Problems Affecting Safety-Related Components*.

The surveillance techniques utilized in the Open-Cycle Cooling Water System program include visual inspection with thermal and hydraulic performance monitoring of heat exchangers. The control techniques utilized in the Open-Cycle Cooling Water System program include (1) water chemistry controls to mitigate the potential for the development of aggressive cooling water conditions, (2) flushes and (3) physical and/or chemical cleaning of heat exchangers and of the ECW pump suction bay to remove fouling and to reduce the potential sources of fouling.

Additional measures used to manage loss of material due to selective leaching for aluminum bronze components in the ECW system are detailed in the plant-specific aging management program Selective Leaching of Aluminum Bronze (B2.1.37).

NUREG-1801 Consistency

The Open-Cycle Cooling Water System program is an existing program that, following enhancement, will be consistent with exception to NUREG-1801, Section XI.M20, Open-Cycle Cooling Water System.

Exceptions to NUREG-1801

Program Elements Affected:

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M20, Elements 2, 3 and 4, provide for a program of flushing and inspection to confirm that fouling and degradation of surfaces is not occurring. An exception is taken to flushing the ECW train cross-tie dead legs and inspecting the interior of these lines. Instead, the external surfaces of the cross-tie lines are included in the six month dealloying visual external inspection walkdowns. The cross-tie valves and piping are also included in the essential cooling water system inservice pressure test, which includes VT-2 inspections of these components. Measures used to manage loss of material due to selective leaching are detailed in the Selective Leaching of Aluminum Bronze program (B2.1.37). These inspections and tests provide confidence in the ability to detect leakage in the piping and valves. The cross-tie lines do not have an intended function and are not required for any accident scenario within the design basis of the plant. The cross-tie valves are maintained locked closed.

Enhancements

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

Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to include visual inspection of the strainer inlet area and the interior surfaces of the adjacent upstream and downstream piping. Material wastage, dimensional change, discoloration, and discontinuities in surface texture will be identified. These inspections will provide visual evidence of loss of material and fouling in the ECW system and serve as an indicator of the condition of the interior of ECW system piping components otherwise inaccessible for visual inspection. Procedures will also be enhanced to include the acceptance criteria for this visual inspection.

Operating Experience

Industry operating experience evaluations, Maintenance Rule Periodic Assessments, and OCCW component performance testing results have shown that the effects of aging are being adequately managed.

A review of the STP plant specific operating experience indicates that macrofouling, general corrosion, erosion corrosion, and through-wall de-alloying have been observed in aluminum bronze components. STP has analyzed the effects of the through-wall de-alloying and found that the degradation is slow so that rapid or catastrophic failure is not a consideration, and determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended functions of the essential cooling water and essential cooling water screen wash system. A long range improvement plan and engineering evaluation were developed to deal with the de-alloying of aluminum bronze components. Based on these analyses, the approach has been to evaluate components, and schedule replacement by the corrective action program. Components with indications of through-wall de-alloying, greater than one inch, will be replaced by the end of the next refueling outage. A monitoring and inspection program provides confidence in the ability to detect the leakage.

NRC Generic Letter 89-13 was based on industry operating experience and forms the basis for the STP OCCW System program.

Conclusion

The continued implementation of the Open-Cycle Cooling Water System program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.10 Closed-Cycle Cooling Water System

Program Description

The Closed-Cycle Cooling Water (CCCW) System program manages loss of material, cracking, and reduction of heat transfer for components within the scope of license renewal in the CCCW systems. The program provides for preventive measures to minimize corrosion including maintenance of corrosion inhibitor and biocide concentrations, and periodic system and component testing and inspection. Preventive measures include the monitoring and control of corrosion inhibitors and other chemical parameters, such as pH, in accordance with the guidelines of EPRI TR-107396, Revision 1. Periodic inspection and testing to confirm function and monitor corrosion is performed in accordance with EPRI TR-107396, Revision 1, and industry and plant operating experience.

The CCCW systems within the scope of license renewal scope are:

- Component cooling water (CCW),
- ESF diesel generator closed cooling water (a subsystem of the standby diesel generator and auxiliaries system),
- BOP DG closed cooling water (a subsystem of the nonsafety-related diesel generator and auxiliary fuel oil system),
- Fire pump diesel closed cooling water (a subsystem of the fire protection system), and
- Chilled water HVAC system consists of subsystems essential chilled water system, reactor containment building (RCB) chilled water system, mechanical auxiliary building (MAB) chilled water system and the technical support center (TSC) chilled water system

These systems meet the definition of a CCCW system in NUREG-1801, Section XI.M21. Also in scope are portions of additional systems (heat exchangers or coolers) that are serviced by these systems.

The CCCW System program is based on the EPRI closed-cooling water chemistry guidelines. Currently, the STP CCCW System program uses *Closed Cooling Water Chemistry Guideline: Revision 1 to TR-107396, Closed Cooling Water Chemistry Guideline* (TR-1007820). The STP CCCW System program is updated as revisions to the EPRI guideline are released.

The program maintains water chemistry within the parameter limits specified in plant procedures and consistent (with exceptions) with those in EPRI TR-107396, Revision 1, in order to minimize corrosion and microbiological growth. STP employs two types of nitrite-based corrosion inhibitor treatment programs, tolyltriazole (TTA) as a copper corrosion inhibitor, and glutaraldehyde as a biocide. STP also utilizes glycol-based corrosion inhibitors.

The CCCW System program includes non-chemistry monitoring of components consistent with EPRI TR-107396, Revision 1, Section 8.4 (Non-Chemistry Monitoring). Periodic performance testing of the CCW heat exchangers is part of the STP Open-Cycle Cooling Water System program. Diesel engine performance parameters are monitored through periodic surveillance tests. The CCW pumps are periodically tested to verify pump performance. The extent and schedule of testing and inspections of the CCCW systems assures detection of loss of material, cracking, and reduction of heat transfer prior to the loss of intended function of the system or component. In addition, visual inspections of selected components are used as an indicator of the condition of internal surfaces exposed to the CCW System. These tests and inspections together with periodic sampling and control of water chemistry are adequate to ensure component intended functions are maintained.

NUREG-1801 Consistency

The Closed-Cycle Cooling Water System program is an existing program that, following enhancement, will be consistent, with exception to NUREG-1801 Section XI.M21, Closed-Cycle Cooling Water System.

Exceptions to NUREG-1801

<u>Program Elements Affected:</u>

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3), and Acceptance Criteria (Element 6)

EPRI TR-107396, Revision 1, Table 5-1, establishes chloride and fluoride as control parameters which should be monitored monthly. STP does not monitor or analyze chloride and fluoride as control parameters in the HVAC chilled water systems. At STP chloride and fluoride are monitored as diagnostic parameters in the HVAC chilled water systems with an Alert Value of 5 ppm for both chloride and fluoride which is more restrictive than the EPRI control parameter normal operating range of less than or equal to 10 ppm for both chloride and fluoride. Chemistry control of chloride and fluoride in the HVAC chilled water systems is therefore consistent, but not identical, with the EPRI recommended approach. At STP, if the system contains no stainless steel or temperatures are less than 150 F, then chlorides and fluorides are diagnostic parameters due to general corrosion concerns. The makeup water to the HVAC chilled water systems is demineralized and there are no known pathways for chloride or fluoride to enter the HVAC chilled water systems cooling water.

Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), and Monitoring and Trending (Element 5)

NUREG-1801 states that the Closed-Cycle Cooling Water System program should conduct performance/functional testing. At STP, performance/functional testing is not performed on the heat exchangers served by the in-scope CCCW Systems. EPRI TR-107396, Revision1, does not include performance monitoring and functional testing of heat exchangers or other components. The Closed-Cycle Cooling Water System program utilizes corrosion monitoring which includes component inspections to monitor program effectiveness in managing component degradation that could impact a passive function. Chemical analysis of iron and copper in the bulk water is performed to monitor the buildup of dissolved corrosion products. Higher than expected concentration levels of total iron and copper indicate possible corrosion within the CCCW systems. Measurement of accumulated corrosion products such as iron and copper provides an indirect indication of system corrosion.

Reductions in heat transfer are managed through a combination of chemistry controls and inspection activities. Chemistry controls are generally adequate to prevent buildup of significant fouling on heat exchanger surfaces.

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), and Acceptance Criteria (Element 6)

The program described in NUREG-1801, Section XI.M21, is based on the 1997 version of the EPRI Closed Cooling Water Chemistry Guideline, TR-107396, Revision 0. The STP program currently uses the 2004 version of the EPRI Closed Cooling Water Chemistry Guideline, Revision 1. This exception is acceptable because the EPRI Closed Cooling Water Chemistry Guideline is a consensus document that is updated based on new operating experience, research data, and expert opinion. Incorporation of later versions of the guidance document ensures that the program addresses new information.

Enhancements

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

Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), and Corrective Actions (Element 7)

Procedures will be enhanced to include visual inspection of the interior of the piping that is attached to the excess letdown heat exchanger CCW return second check valves. This periodic internal inspection will detect loss of material and fouling and serve as a leading indicator of the condition of the interior of piping components otherwise inaccessible for visual inspection. The procedures will also be enhanced to include acceptance criteria.

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), and Corrective Actions (Element 7):

Procedures will be enhanced to monitor chemistry parameters consistent with EPRI guideline recommendations for the glycol-based formulations used for the BOP and fire pump diesel jacket water cooling systems. EPRI TR-107396, Revision 1, Tables 5-8 and 5-9 (blended glycol formulations), recommend periodically monitoring control parameters, and EPRI Tables 5-8 and 5-9 recommend periodically monitoring diagnostic parameters.

Operating Experience

The Closed-Cycle Cooling Water System program is based on the guidance contained in EPRI TR-107396, Revision 1, which itself is based on industry-wide operating experience. The guideline is periodically updated and approved by the industry. STP operating experience is evaluated and corrective actions are implemented for chemical concentrations, monitoring and testing to ensure adherence to EPRI TR-107396, Revision 1. Industry operating experience and independent audits provide additional input to ensure that program operability is maintained at an optimum level.

Based on a review of STP operating experience, there is no history of chemistry related corrosion or fouling issues for the component cooling water system, ESF DG jacket water system, essential chilled water, RCB chilled water, MAB chilled water and BTRS chilled water systems. Past inspections of component cooling water system and ESF DG jacket water piping have indicated a clean and tight adherent passive oxide layer.

In 1999, Sure-Cool residue buildup was observed on the outside of a carbon steel flange in the component cooling water system return piping from the spent fuel pool heat exchanger. Investigation revealed a through-wall crack in the weld neck flange about 1.1-in. from the flange to pipe weld. The flange was weld repaired. The cracked weld showed no signs of loss of material, verified by ultrasonic test.

In 2003, a leak occurred in a coil to header joint of a reactor containment fan cooler. Initial observations of the leak detected no indications of corrosion. The attempt to repair the leak, by brazing, melted the coil tubing. The damage prohibited further examination and determination of the actual cause of the leak. An evaluation of the event determined the cause of the leak was not attributed to an aging effect.

The BOP diesel jacket water system radiator has been replaced due to corrosion. The FPD jacket water system cores have been changed due to corrosion prior to using the current corrosion inhibitor.

MIC (Microbiologically-Influenced Corrosion) has not been observed in the in-scope CCCW systems.

Based on a review of 10 years of STP operating experience, any chemistry parameters outside of established limits have been identified and the appropriate actions taken. Corrective actions have included increasing sampling frequencies, chemical addition, feed and bleeds, system cleaning and fixing leaks.

Conclusion

The continued implementation of the Closed-Cycle Cooling Water System program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.11 Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

Program Description

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program manages loss of material for all cranes, trolley and hoist structural components, fuel handling equipment and applicable rails within the scope of license renewal. Visual inspections will assess conditions such as loss of material due to corrosion of structural members and visible signs of rail wear.

The inspections for the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program are performed using various preventive maintenance work orders. The inspection requirements are consistent with:

1) The guidance provided by NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants,* for load handling systems that handle heavy loads which can directly or indirectly cause a release of radioactive material.

2) Applicable industry standards (such as CMAA Spec 70) for other cranes within the scope of license renewal.

3) Applicable OSHA regulations (such as 29 CFR Volume XVII, Part 1910 and Section 1910.179).

NUREG-1801 Consistency

The Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.M23, Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems.

Exceptions to NUREG-1801

None

Enhancements

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

Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to inspect crane structural members for loss of material due to corrosion and rail wear.

Operating Experience

Based on a review of STP operating experience, no occurrences of wear for components within the scope of the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program have been identified. Several instances of corrosion on various component surfaces were identified. Examples include the circulating water gantry crane, where corroded fasteners were found in both 2000 and 2007, and the Unit 1 main turbine crane, which was found in 2001 with corrosion at the interface between the bridge walkway and crane girder. These items were corrected by either replacing the corroded fasteners or removing the corrosion and recoating the components. Additionally, since STP cranes, hoists, trolleys and fuel handling equipment have not been operated outside their design limits without appropriate evaluations, no fatigue related structural failures have occurred.

Conclusion

The continued implementation of the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.12 Fire Protection

Program Description

The Fire Protection program manages loss of material of fire rated doors, fire dampers, and the Halon fire suppression system, concrete cracking, spalling, and loss of material of fire barrier walls, ceilings, and floors, and increased hardness, shrinkage, and loss of strength of fire barrier penetration seals. The Fire Protection program is a condition and performance monitoring program comprised of tests and inspections that follow the applicable National Fire Protection Association (NFPA) recommendations. Periodic visual inspections of fire barrier penetration seals, fire dampers, fire barrier walls, ceilings and floors, and periodic visual inspections and functional tests of fire-rated doors are performed to ensure that they can perform their intended function.

The Fire Protection program performs a visual inspection on approximately 10 percent of each type of penetration seal at least once every 18 months. The Fire Protection program performs a visual inspection of the fire barrier walls, ceilings, and floors, including coating and wraps (raceway fire wrap and hatch covers) at least once every 18 months, examining for any signs of aging such as cracking, spalling, and loss of material. The Fire Protection program performs visual inspections on fire dampers on an 18-month basis. The Fire Protection program performs a visual inspection, every 18 months, on fire-rated doors to verify the integrity of door surfaces and for clearances, to detect aging of the fire doors prior to loss of intended function. Visual inspections are performed at least once every six months to identify conditions of corrosion and mechanical damage in the Halon flow path. A functional test of the Halon fire suppression system is performed every 18 months. Inspectors are required to be qualified in accordance with implementing procedures.

NUREG-1801 Consistency

The Fire Protection program is an existing program that, following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M26, Fire Protection.

Exceptions to NUREG-1801

<u>Program Elements Affected:</u>

Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)

NUREG-1801 recommends a functional test of the halon system every six months. The STP procedure for functional testing of the Halon fire suppression system, is performed every 18 months. The 18-month functional testing interval, together with visual inspection performed on a six-month interval, provides assurance that intended function will be maintained through the period of extended operation. A review of 10 years of operating experience and corrective action documentation shows no degradation or loss of intended function between test dates.

Enhancements

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

Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to provide visual inspection for corrosion and mechanical damage on halon system components at least once every six months.

Procedures will be enhanced to provide inspections to detect the following penetration seal deficiencies: signs of degradation such as cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to include qualification criteria for individuals performing inspections of fire doors, fire barrier penetration seals, fire barrier walls, ceilings and floors in accordance with NUREG-1801.

Acceptance Criteria (Element 6)

Procedures will be enhanced to include the following fire barrier inspection acceptance criteria: no cracks, spalling, or loss of material that would prevent the barrier from performing its design function.

Procedures will be enhanced to provide visual inspection for degradation, corrosion and mechanical damage on Halon system components at least once every six months.

Operating Experience

A review of the past 12 years of plant operating experience through STP condition reporting documentation shows that all identified degradation of the fire protection system has occurred gradually, making failure of the system function not a consideration.

The review of operating experience contained in STP condition reports (CRs) were evaluated for aging effects associated with the Fire Protection program. Of these CRs, 14 were determined to have applicable aging effects associated with the Fire Protection program. The following is a summary of the aging effects reported in these CRs.

Leakage has been observed from the diesel fire pump lubricating oil and the air supply pressure control valve. The associated connections were repaired and no further leakage has been observed from these locations.

Corrosion has been discovered on fire doors, fire door frames. The corrosion was removed and coatings were reapplied.

Degradation has been observed in fire proofing and as cracks or penetration seal shrinkage in fire barriers. This degradation has been the subject of several NRC information notices. These notices were addressed by STP and resulted in additional inspections, increases in inspection frequencies and evaluations of inspection procedures. These cracks occur so gradually that they are easily detected before a flaw reaches the size that could affect the intended function of the system.

These examples show that the Fire Protection program inspections and monitoring are effective in addressing degraded conditions and addressing them within the Corrective Action program.

Conclusion

The continued implementation of the Fire Protection program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.13 Fire Water System

Program Description

The Fire Water System program manages loss of material for water-based fire protection systems consisting of piping, fittings, valves, sprinklers, nozzles, hydrants, hose stations, standpipes and water storage tanks. Periodic hydrant inspections, fire main flushing, sprinkler inspections, and flow tests in accordance with National Fire Protection Association (NFPA) codes and standards ensure that the water-based fire protection systems are capable of performing their intended function. The fire water system pressure is continuously monitored such that loss of system pressure is immediately detected and corrective actions initiated.

The Fire Water System program conducts an air or water flow test through each open head spray/sprinkler nozzle to verify the flow is unobstructed. The Fire Water System program will replace sprinklers prior to 50 years in service or the program will field service test a representative sample of the sprinklers and test them every 10 years thereafter during the period of extended operation to ensure signs of degradation, such as corrosion, are detected in a timely manner.

Volumetric examinations will be performed on fire water piping. As an alternative, internal inspections will be performed on accessible exposed portions of fire water piping during plant maintenance activities. The inspections detect loss of material due to corrosion, ensure that aging effects are managed, ensure wall thickness is within acceptable limits, and detect degradation before the loss of intended function. If a representative number of inspections have not been completed prior to the period of extended operation, the fire protection coordinator determines that additional inspections or examinations are required, locations will be selected based on system susceptibility to corrosion or fouling and evidence of performance degradation during system flow testing or periodic flushes. If material and environment conditions for above grade and below grade piping are similar, the results of the inspections of the internal surfaces of the above grade fire protection piping can be extrapolated to evaluate the condition of the internal surfaces of the below grade fire protection piping. If not, additional inspection activities are needed to ensure that the intended function of below grade fire protection piping will be maintained consistent with the current licensing basis.

NUREG-1801 Consistency

The Fire Water System program is an existing program that, following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M27, Fire Water System.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1)

NUREG-1801 provides a program for managing carbon steel and cast iron components in fire water systems. The fire water system contains additional materials of construction, specifically, copper alloy and stainless steel. The Fire Water System program manages aging effects of copper alloy and stainless steel fire water system components with an internal environment of water.

Detection of Aging Effects (Element 4)

NUREG-1801 requires inspection of fire protection systems in accordance with the guidance of NFPA-25. STP performs power block hose station gasket inspections at least once every 18 months, rather than annually as specified by NFPA-25. STP has been inspecting at an 18 month frequency for over 10 years, and no degradation leading to a loss of function has occurred. A visual inspection of hose stations is conducted every six months for accessible locations and 18 months for stations that are not accessible during normal operations. These hoses are also hydrostatically tested every three years. Hoses are replaced when indications of deterioration are observed either by visual inspection or failure of a hydrostatic test, this replacement includes inspection of the gasket. Since aging effects are typically manifested over several years, differences in inspection and testing frequencies are insignificant.

Enhancements

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

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3,) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to include volumetric examinations or direct measurement on representative locations of the fire water system to determine pipe wall thickness.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to replace sprinklers prior to 50 years in service or field service test a representative sample and test every 10 years thereafter to ensure signs of degradation are detected in a timely manner.

Monitoring and Trending (Element 5)

Procedures will be enhanced for trending of fire water piping flow parameters recorded during fire water flow tests.

Operating Experience

A review of the past 12 years of plant operating experience showed no signs of gasket degradation or fire hose degradation due to inspection intervals of 18 months and three years, respectively.

The review of operating experience contained in STP condition reports (CRs) were evaluated for aging effects associated with the Fire Water System program. Of these CRs, 45 were determined to have applicable aging effects associated with the Fire Water System program. The following is a summary of the aging effects reported in these CRs.

Leakage has been discovered coming from supply line piping connections. The associated connections were repaired by replacing the gasket and no further leakage has been observed from these locations. Leakage from fire hydrants has been observed at hydrant barrel connections. The hydrants were evaluated and replaced. Drain valves have leaked by causing corrosion to the associated surface. The valves were replaced and the problem was corrected. Leakage has been observed from the threaded connections to installed relief valves. These connections were repaired and no further leakage has been observed from the threaded connections. Valve packing leakage in supply line valves has caused corrosion of the associated packing follower and retaining bolts. The leakage was corrected and degraded components were evaluated and replaced where required.

While performing the fire year inspection of a fire water storage tank it was noted that the base of the tank needed repainted, that a weld located at the top of the tank between the roof and sidewall needed to be repaired and a recirculation line pipe hanger needed to be replaced. The base of the tank was repainted, the weld was repaired and the hanger was replaced. No loss of intended function occurred.

Based on this review of STP operating experience, the Fire Water System program effectively identifies and corrects the fire water system components aging effects prior to the loss of intended function.

Conclusion

The continued implementation of the Fire Water System program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.14 Fuel Oil Chemistry

Program Description

The Fuel Oil Chemistry program manages loss of material on the internal surface of components in the standby diesel generator (SDG) fuel oil storage and transfer system, diesel fire pump fuel oil system and balance of plant (BOP) fuel oil system. The program includes (a) surveillance and monitoring procedures for maintaining fuel oil quality by controlling contaminants in accordance with applicable ASTM Standards, (b) periodic draining of water from fuel oil tanks, (c) visual inspection of internal surfaces during periodic draining and cleaning, (d) ultrasonic wall thickness measurement or pulsed eddy current wall thickness measurement of fuel oil tank bottoms during periodic draining and cleaning, (e) inspection of new fuel oil before it is introduced into the fuel oil tanks, and (f) one-time inspection of a representative sample of component in systems that contain fuel oil by the One-Time Inspection program (B2.1.16).

Fuel oil quality is maintained by monitoring and controlling fuel oil contaminants in accordance with applicable ASTM Standards. This is accomplished by periodic sampling and chemical analysis of the fuel oil inventory at the plant, and sampling, testing, and analysis of new fuel oil prior to introduction into the fuel oil storage tanks. Initial samples of new fuel oil are inspected for water and entrained foreign material as precautions during the delivery process to avoid introducing contaminants. If a sample appears unsatisfactory, delivery is discontinued or not allowed.

The One-Time Inspection program (B2.1.16) is used to verify the effectiveness of the Fuel Oil Chemistry program.

NUREG-1801 Consistency

The Fuel Oil Chemistry program is an existing program that, following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M30, Fuel Oil Chemistry.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1) and Acceptance Criteria (Element 6)

NUREG-1801 states that fuel oil quality is maintained in accordance with ASTM Standards D1796, D2276, D2709, D6217, and D4057; ASTM Standards D6217 and Modified D2276, Method A are used for guidance for determination of particulates. The modification to D2276 consists of using a filter with a pore size of 3.0 microns, instead of 0.8 micron. STP program specifies fuel oil particulate concentrations are measured using a 0.8 micron nominal pore size filter, in accordance with ASTM-D2276. STP Technical Specification

6.8.3.i.3 specifies using a test method based on ASTM-D2276 to assure total particulate concentration is < 10mg/l.

The basis for use of ASTM-D2276 instead of ASTM-D6217 is the following: ASTM-D2276 provides guidance on determining particulate contamination using a field monitor. It provides for rapid assessment of changes in contamination level without the time delay required for rigorous laboratory procedures. ASTM-D6217 provides guidance on determining particulate contamination by sample filtration at an off-site laboratory. Neither method contains acceptance criteria or is more stringent than the other. ASTM-D2276 is an accepted method of determining particulates, a method recommended by ASTM-D975, and STP is committed by Technical Specification to follow its guidance.

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), and Acceptance Criteria (Element 6)

NUREG-1801 states that ASTM-D2709 is used for guidance in determining water and sediment contamination in diesel fuel. STP uses only ASTM-D1796, not ASTM-D2709, for determining water and sediment contamination in diesel fuel. The testing conducted using ASTM-D1796 gives quantitative results, whereas ASTM-D2709 testing gives only pass-fail results. Therefore, the ASTM-D1796 method gives more descriptive information about the fuel oil condition than the ASTM-D2709 method.

NUREG-1801 states that ASTM-D4057 is used for guidance on oil sampling. This standard requires that multilevel sampling be performed for tanks the size of the SDG fuel oil storage tanks. The Fuel Oil Chemistry program is focused on managing the conditions that cause general, pitting, and microbiologically-influenced corrosion (MIC) of the diesel fuel tank internal surfaces. The fuel oil contaminants settle at the bottom of the tank and are removed along with the water that has settled on the bottom. The fuel oil contaminants settle to the bottom of the tank, so only the bottom is sampled for contaminant concentrations. The fuel oil in the other levels of the tank contains less contaminants per volume than the bottom, making sampling away from the bottom ineffective in managing fuel oil contaminants.

Parameters Monitored or Inspected (Element 3) and Acceptance Criteria (Element 6)

NUREG-1801 states that a filter with a pore size of 3.0 microns will be used in the determination of particulates. STP uses a filter with a pore size of 0.8 micron per ASTM-D2276. STP Technical Specifications provide for the use of ASTM-D2276 for the analysis of fuel oil. Using a smaller pore size is a more conservative inspection, since more contaminants will be captured when using a filter with a smaller pore size. Thus, a filter with a smaller pore size than 3.0 microns is acceptable in the inspection of fuel oil contaminant concentrations.

Enhancements

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

Scope of Program (Element 1)

Procedures will be enhanced to extend the scope of the program to include the SDG fuel oil drain tanks.

Scope of Program (Element 1) and Preventive Actions (Element 2)

Procedures will be enhanced to check and remove the accumulated water from the fuel oil drain tanks, day tanks, and storage tanks associated with the SDG, BOP, and fire water pump diesel generators. A minimum frequency of water removal from the fuel oil tanks will be included in the procedure.

Preventive Actions (Element 2), Parameters Monitored or Inspected (Element 3),and Detection of Aging Effects (Element 4)

Procedures will be enhanced to include 10-year periodic draining, cleaning, and inspection for corrosion of the SDG fuel oil drain tanks and diesel fire pump fuel oil storage tanks.

Procedures will be enhanced to inspect the BOP diesel generator fuel oil day tanks for internal corrosion.

Procedures will be enhanced to require periodic testing of the SDG and diesel fire pump fuel oil storage tanks for microbiological organisms.

Parameters Monitored or Inspected (Element 3), Monitoring and Trending (Element 5), and Acceptance Criteria (Element 6)

Procedures will be enhanced to require analysis for water, sediment, and particulate contamination of the diesel fire pump fuel oil storage tanks and the BOP diesel generator fuel oil day tanks on a quarterly basis.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to conduct ultrasonic testing or pulsed eddy current thickness examination to detect corrosion-related wall thinning once on the tank bottoms for the SDG and diesel fire pump, and the BOP diesel generator fuel oil day tanks.

Monitoring and Trending (Element 5)

Procedures will be enhanced to incorporate the sampling and testing of the diesel fire pump fuel oil storage tanks for particulate contamination and water and to incorporate the trending of water, particulate contamination, and microbiological activity in the SDG and diesel fire pump fuel oil storage tanks, and the BOP diesel generator fuel oil day tanks.

Operating Experience

STP work orders, condition reports, and the chemistry database from 1999 to 2009 related to fuel oil chemistry were reviewed. None were found which documented any type of corrosion. Several occurrences were found in the chemistry database which documented the need to add biocide to the fuel oil due to finding microbiological growth. Condition reports have documented that fuel oil chemistry was out of specification in the following instances:

Water and fine sediment intrusion in the auxiliary fuel oil storage tank, diesel generator fuel oil storage tank, fire pump fuel oil storage tank, and the vendor fuel oil trailer tanks have been found approximately annually due to various reasons including the tank cleaning work and a predisposition of a floating tank roof to allow water to pass through and into tank. Corrective actions for fuel oil tanks, including additional inspections and the draining from the bottom of tanks after allowing the water and sediment to settle, have been effective in bringing the fuel oil chemistry back into specification limits, as proven during inspection procedures.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the Condition Reporting Process or the Operating Experience program.

Conclusion

The continued implementation of the Fuel Oil Chemistry program, supplemented by the One-Time Inspection program (B2.1.16), provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.15 Reactor Vessel Surveillance

Program Description

The Reactor Vessel Surveillance program manages loss of fracture toughness of the reactor vessel beltline material. The Reactor Vessel Surveillance program is designed to ASTM E 185 and complies with 10 CFR 50 Appendix H. Actual reactor vessel coupons are used, but an exemption in the original license permits use of other than beltline weld material for the weld coupons. The surveillance coupons are tested by a qualified offsite vendor, to its procedures. The testing program and reporting conform to the requirements of ASTM E 185-82.

The results are used to project the end-of-life fluence, and demonstrate compliance with Charpy upper-shelf energy requirements in 10 CFR 50 Appendix G and pressurized thermal shock screening criteria in 10 CFR 50.61, using the methodologies in Regulatory Guide 1.99 Revision 2. The results are also used to verify the plants' operating restrictions implemented through the P-T curves.

The removal schedule, approved by the NRC, will expose the remaining capsules to a fluence greater than that expected at the beltline wall at 60 years. This withdrawal therefore meets the ASTM E 185-82 criterion which states that capsules may be removed when the capsule neutron fluence is between one and two times the limiting fluence calculated for the vessel at the end of expected life. The remaining untested capsules will also be withdrawn at this time and stored in the spent fuel pool as spares. Vessel fluence will be determined by ex-vessel dosimetry once all capsules are removed.

NUREG-1801 Consistency

The Reactor Vessel Surveillance program is an existing program that, following enhancement, will be consistent to NUREG-1801, Section XI.M31, Reactor Vessel Surveillance.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancements will be implemented in the following NUREG-1801 “items”:

NUREG-1801 Item 7

NUREG-1801 states “Applicants without in-vessel capsules use alternative dosimetry to monitor neutron fluence during the period of extended operation, as part of the aging management program for reactor vessel neutron embrittlement.”

Procedures will be enhanced to include the withdrawal schedule and analysis of the ex-vessel dosimetry chain.

NUREG-1801 Item 8

NUREG-1801 suggests that "The applicant may choose to demonstrate that the materials in the inlet, outlet, and safety injection nozzles [extended beltline materials] are not controlling, so that such materials need not be added to the material surveillance program for the license renewal term."

STP will demonstrate that the reactor vessel inlet and out nozzles are exposed to a fluence of less than 10^{17} n/cm^2, or will incorporate the adjusted reference temperature (ART) for the inlet and outlet nozzles with bounding chemistry and fluence values into the P-T limit curves.

The program will be enhanced to include the Unit 2 bottom head torus in the Reactor Vessel Surveillance program. This involves including the Unit 2 bottom head torus in the evaluations for P-T limit curves and compliance with the PTS rule. The program will address the surveillance coupon materials in one of the following manners: (1) add coupon material from the Unit 2, bottom head torus, if available; or (2) use data from similar material at another plant, if available. (3) If inclusion of material from the Unit 2 the bottom head torus in the surveillance program is not practical or if data from another plant is not available, Regulatory Guide 1.99 provides methods that can be used, with increased margins to account for uncertainties.

Operating Experience

The latest capsule to be withdrawn from STP Unit 1 was Capsule V in 2007 at 11.13 EFPY with a capsule equivalent age of 34 EFPY. The latest capsule to be withdrawn from STP Unit 2 was Capsule U in 2007 at 10.31 EFPY with a capsule equivalent age of 33 EFPY. The last-tested capsule specimens satisfy the upper-shelf energy criterion and pressurized thermal shock temperature screening criteria. The adjusted reference temperatures have been shown to be less than that used in the P-T limit curves, thereby demonstrating margin in the operating limits.

The current withdrawal schedule calls for the last capsules in each unit to be withdrawn at approximately 18 EFPY, which is equivalent to a vessel exposure of approximately 59 EFPY. This EOLE exposure is greater than the anticipated 54 EFPY end of life fluence.

Conclusion

The continued implementation of the Reactor Vessel Surveillance program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.16 One-Time Inspection

Program Description

The One-Time Inspection program manages loss of material, cracking, and reduction of heat transfer. The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (B2.1.2), Fuel Oil Chemistry program (B2.1.14), and Lubricating Oil Analysis program (B2.1.23).

The One-Time Inspection program will be implemented by STP prior to the period of extended operation. Plant system piping and components identified in the one-time inspection procedure will be subject to one-time inspections on a sampling basis, using qualified inspection personnel, following established ASME Code Section V Non-Destructive Examination techniques appropriate to each inspection. Inspection sample sizes will be determined using a methodology that is based on 90 percent confidence that 90 percent of the population of components will not experience aging effects in the period of extended operation. The One-Time Inspection program specifies corrective actions and increased sampling of piping/components if aging effects are found during material/environment combination inspections.

The one-time inspections will be performed no earlier than 10 years prior to the period of extended operation. All one-time inspections will be completed prior to the period of extended operation. Completion of the One-Time Inspection program in this time period will assure that potential aging effects will be manifested based on at least 30 years of STP operation. Major elements of the STP One-Time Inspection program will include:

a) Identifying piping and component populations subject to one-time inspections based on common materials and environments,

b) Determining the sample size of components to inspect for each material-environment group,

c) Selecting piping and components within the material-environment groups for inspection based on criteria provided in the one-time inspection procedure,

d) Conducting one-time inspections of the selected components within the sample using ASME Code Section V Non-Destructive Examination techniques and acceptance criteria consistent with the design codes/standards or ASME Section XI as applicable to the component,

e) Evaluating inspection results and initiating corrective action for any aging effects found.

NUREG-1801 Consistency

The One-Time Inspection program is a new program that, when implemented, will be consistent with NUREG-1801, Section XI.M32, One-Time Inspection.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

During the 10 year period prior to the period of extended operation, one-time inspections will be accomplished at STP using ASME Code Section V Non-Destructive Examination techniques to identify possible aging effects. ASME code techniques in the ASME Section XI ISI Program have proven to be effective in detecting aging effects prior to loss of intended function. Review of STP plant-specific operating experience associated with the ISI Program has not revealed any ISI Program adequacy issues with the STP ASME Section XI ISI Program. The same Non-Destructive Examination techniques used in the ASME Section XI ISI Program will be used in the One-Time Inspection program. Using ASME Code Section V Non-Destructive Examination techniques will be effective in identifying aging effects, if present.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the One-Time Inspection program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.17 Selective Leaching of Materials

Program Description

The Selective Leaching of Materials program manages the loss of material due to selective leaching for copper alloys with greater than 15 percent zinc and gray cast iron components exposed to treated and raw water within the scope of license renewal.

The Selective Leaching of Materials program is a new program which includes a one-time inspection of a sample of components made from gray cast iron and copper alloys with greater than 15 percent zinc. The program procedure provides for visual and mechanical inspections for each system/material/environment combination and for follow-up engineering evaluation in the event that graphitization of gray cast iron or dezincification of copper alloys with greater than 15 percent zinc components is detected. The plant-specific Selective Leaching of Aluminum Bronze program (B2.1.37) covers aluminum bronze components.

The Selective Leaching of Materials program will be implemented during the 10 years prior to the period of extended operation.

NUREG-1801 Consistency

The Selective Leaching of Materials program is a new program that, when implemented, will be consistent, with exception to NUREG-1801, Section XI.M33, Selective Leaching of Materials.

Exceptions to NUREG-1801

<u>Program Elements Affected:</u>

Scope of Program (Element 1)

NUREG-1801, Section XI.M33 states that the Selective Leaching of Materials program should include bronze or aluminum bronze components that may be exposed to a raw water, treated water, or groundwater environment. Aluminum bronze is not managed by the Selective Leaching of Materials program. STP currently has a plant specific Selective Leaching of Aluminum Bronze program (B2.1.37), which covers these aluminum bronze components. This existing program better describes the ongoing efforts to manage the de-alloying of aluminum bronze components. This plant-specific program will utilize the requirements of NUREG-1801 to address aluminum bronze components susceptible to selective leaching (de-alloying).

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), and Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M33 recommends hardness testing of sample components in addition to visual inspections. However, a qualitative determination of selective leaching is used in lieu of Brinell hardness testing for components within the scope of the STP Selective Leaching of Materials program. The exception involves the use of examinations, other than Brinell hardness testing, identified in NUREG-1801 to identify the presence of selective leaching of materials. The exception is justified; because (1) hardness testing may not be feasible for most components due to form and configuration and (2) other mechanical means (e.g., scraping, or chipping) provide an equally valid means of identification.

Additionally, hardness testing only provides definitive results if baseline values are available for comparison purposes. Specific material contents for copper alloys may not be known and gray cast irons may not have published hardness numbers. Without specific numbers for comparison, hardness testing would yield unusable results. In lieu of hardness testing, visual and mechanical inspections will be performed on a sampling of components constructed of copper alloys with greater than 15 percent zinc and gray cast iron from various station system environments. Follow-up examinations or evaluations are performed on component material samples where indications of dezincification, de-alloying, or graphitization are visually detected and additional analysis, as part of the engineering evaluation, is required. The engineering evaluation may require confirmation with a metallurgical evaluation (which may include a microstructure examination).

Enhancements

None

Operating Experience

To date there have been no reported cases of loss of material attributable to graphitization or dezincification.

Through-wall cracks have been identified in essential cooling water system piping initiated by pre-existing weld defects and propagated by a de-alloying phenomenon. The flaws evaluated appeared in welds with backing rings. STP has analyzed the effects of the cracking and found that the degradation is slow so that rapid or catastrophic failure is not a consideration and determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended function of the essential cooling water system. A monitoring and inspection program provides confidence in the ability to detect the leakage. In order to identify and evaluate future leaks, the accessible large bore piping welds with backing rings are visually inspected every six months for evidence of leakage. A walk down of the yard above buried essential cooling water system pipe is performed every six months for evidence of soil changes that may indicate pressure boundary leakage. The most susceptible components are cast aluminum bronze fittings (flanges and tees) with backing ring welds. A special VT-2 visual examination of the system is performed every six months to identify new de-alloying locations. An operability review and an NRC relief request are performed for all through-wall leaks in piping larger than one-inch in diameter. The long-term strategy for essential cooling water system piping de-alloying is to replace fittings when through-wall de-alloying is discovered. This strategy is acceptable based on the very slow degradation mechanism coupled with the preservation of structural integrity and is consistent with the EPRI Service Water Piping Guideline. These ongoing activities are detailed in the Selective Leaching of Aluminum Bronze program (B2.1.37) and are examples of where selective leaching was detected and plant procedures and inspection activities were implemented to ensure that the intended functions of the essential cooling water system are maintained.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the Selective Leaching of Materials program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.18 Buried Piping and Tanks Inspection

Program Description

The Buried Piping and Tanks Inspection program manages the loss of material on external surfaces of buried, underground, and limited-access components. Opportunistic visual inspections monitor the condition of protective coatings and wrappings found on steel, stainless steel and copper alloy components. Gray cast iron, which is included under the definition of steel, is also subject to a loss of material due to selective leaching, which is an aging effect managed by the Selective Leaching of Materials program (B2.1.17). Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of the components.

The Buried Piping and Tanks Inspection program performs opportunistic inspections whenever pipes are excavated or exposed for any reason. There are no buried tanks at STP. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.

The need to enhance the STP buried piping program was initially identified as a result of an INPO identified area for improvement. Since that time involvement with the industry to address several areas has identified areas for program enhancement. The enhancement of the program is ongoing utilizing guidance from NEI 09-14, Revision 1, *Guideline for the Management of Buried Piping Integrity*, and industry operating experience. STP is also assessing guidance provided in the preliminary NUREG-1801, *Generic Aging Lessons Learned,* Revision 2.

Any inspection that indicates a potentially degraded condition results in the initiation of corrective actions for further engineering evaluation in accordance with the STP condition reporting process. The engineering evaluation may specify additional inspection techniques to evaluate the degree and extent of degradation. The engineering evaluation determines the acceptability of the component for continued service and the frequency of continued monitoring.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection program is an existing program that, following enhancement, will be consistent with exception to NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1) and Parameters Monitored or Inspected (Element 3)

The NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection program scope includes buried steel piping and components. There are copper alloy and stainless steel materials in buried components within the scope of license renewal. Therefore, the scope of the program has been expanded to manage the buried surfaces of the copper alloy and stainless steel components.

Enhancements

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

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify the following requirements: Opportunistic inspections are performed whenever pipes are excavated or exposed for any reason. If an opportunistic inspection has not been performed within the 10 year period prior to entering the period of extended operation, a planned inspection will be performed. Upon entering the period of extended operation, a planned inspection will be required within 10 years, unless an opportunistic inspection has occurred within this 10 year period.

Operating Experience

A 10-year review of plant operating experience shows 30 events which were initially associated with buried piping. Nine of these events were related to systems or components in scope of license renewal. All of these were leaks shown to not be a result of corrosion or leaching of materials, making them not relevant to aging management. The Buried Piping and Tanks Inspection program (developed in 2009) has shown no evidence of corrosion in buried piping and includes availability, reliability, maintainability, and capacity measurement analyses published in bi-annual Health Reports. The system deficiencies described in the Health Reports created so far are all attributed to causes other than corrosion or leaching due to contact with the soil environment (most leaks were associated with mechanical joints).

The Buried Piping and Tanks Inspection program requires review of plant and industry operating experiences for impacts to the program. This program ensures long-term strategies to address Buried Piping and Tanks Inspection are developed and implemented.

Conclusion

The continued implementation of the Buried Piping and Tanks Inspection program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.19 One-Time Inspection of ASME Code Class 1 Small-Bore Piping

Program Description

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program manages cracking of ASME Code Class 1 piping less than or equal to four inches nominal pipe size (NPS 4). This piping is ASME examination category B-J. This program is implemented as part of the fourth interval of the ISI Program.

For ASME Code Class 1 small-bore piping, the ISI Program requires volumetric examinations (by ultrasonic testing) on selected butt weld locations to detect cracking. Weld locations are selected based on the guidelines provided in EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*. Ultrasonic examinations are conducted in accordance with ASME Section XI with acceptance criteria from paragraph IWB-3000 and IWB-2430 for butt welds. If no socket welds are in the sample population, then at least five percent of the socket welds in each unit will be selected.

Socket welds that fall within the weld examination sample will be examined following ASME Section XI Code requirements. If a qualified volumetric examination procedure for socket welds endorsed by the industry and the NRC is available and incorporated into the ASME Section XI Code at the time of STP small-bore socket weld inspections, then this will be used for the volumetric examinations. If no volumetric examination procedure for ASME Code Class 1 small-bore socket welds has been endorsed by the industry and the NRC and incorporated into ASME Section XI at the time STP performs inspections of small-bore piping, a plant procedure for volumetric examination of ASME Code Class 1 small-bore piping with socket welds will be used.

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program inspections will be completed and evaluated within 10 years prior to the period of extended operation.

In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI Program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition of the ASME Code specified 12 months before the start of the inspection interval. STP will use the ASME Code Edition consistent with the provisions of 10 CFR 50.55a during the 10 year period prior to the period of extended operation (fourth interval) and during the period of extended operation.

NUREG-1801 Consistency

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is a new program that, when implemented, will be consistent, with exception to NUREG-1801, Section XI.M35, One-Time Inspection of ASME Code Class 1 Small-Bore Piping.

Exceptions to NUREG-1801

Program Elements Affected

Scope of Program (Element 1)

The STP risk-informed process examination requirements are performed consistent with EPRI TR-112657, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Revision B-A, instead of EPRI Report 1000701, *Interim Thermal Fatigue Management Guidance (MRP-24)*. Guidelines for identifying piping susceptible to potential effects of thermal stratification or turbulent penetration that are provided in EPRI Report 1000701 are also provided in EPRI TR-112657. The recommended inspection volumes for welds in EPRI Report 1000701 are identical to those for inspection of thermal fatigue in RI-ISI Programs; thus, the STP risk-informed process examination requirements meet the recommendations of NUREG-1801.

Enhancements

None

Operating Experience

In order to estimate the extent of cracking in Class 1 piping socket welds, NEI conducted a review of LERs. Of 141 LERs reviewed, 48 were determined to be associated with failures of Class 1 socket welds. For the 46 LERs where a cause was identified, 42 of the failures were due to either vibration-induced high cycle fatigue or improper installation and are not age-related. Of the four remaining failures, one was due to randomly applied loads during maintenance and not age-related, and three were related to aging: two due to insulation contamination on the outside surface, and one associated with IGSCC, although there were other contributing factors not associated with aging (poor weld fit up, weld repair, nearby missing support, etc.).

The NEI review indicates that there have been a relatively small number of Class 1 socket weld failures of which only three were related to aging.

A review of plant-specific operating experience indicates that no cracking has been observed for ASME Code Class 1 small-bore pipe welds less than or equal to NPS 4.

Based on a review of operating experience, cracking of ASME Code Class 1 small-bore pipe welds less than or equal to NPS 4 has not been observed. This provides confidence that the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program is adequate to manage cracking in ASME Code Class 1 small-bore piping is not occurring.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the One-Time Inspection of ASME Code Class 1 Small-Bore Piping program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.20 External Surfaces Monitoring Program

Program Description

The External Surfaces Monitoring Program manages loss of material for external surfaces of steel, stainless steel, aluminum, copper alloy components and elastomers, and hardening and loss of strength for elastomers. The program is a visual monitoring program that includes those systems and components within the scope of license renewal. Visual inspections are used to identify aging effects and leakage for steel, stainless steel, aluminum, and copper alloy components, and hardening and loss of strength for elastomers. When appropriate for the component configuration and material, physical manipulation of elastomers is used to augment visual inspections to confirm the absence of hardening or loss of strength. Personnel performing external surfaces monitoring inspections will be qualified in accordance with site controlled procedures and processes.

The External Surfaces Monitoring Program will be implemented by a new procedure. System inspections and walkdowns will be required and will consist of periodic visual inspections for indications of loss of material, leakage, elastomer hardening and loss of strength.

The following aging management programs are used to manage aging for external surfaces that are not within the scope of the External Surfaces Monitoring Program.

1) Boric Acid Corrosion program (B2.1.4) for components in a system with treated borated water or reactor coolant environment in which boric acid corrosion may occur.

2) Buried Piping and Tanks Inspection program (B2.1.18) for buried components.

3) Structures Monitoring Program (B2.1.32) for civil structures, and other structural items which support and contain mechanical and electrical components.

The External Surfaces Monitoring Program is a new program that will be implemented prior to the period of extended operation. Within the ten year period prior to the period of extended operation, and continuing into the period of extended operation, periodic inspections will be performed.

NUREG-1801 Consistency

The External Surfaces Monitoring program is a new program that, when implemented, will be consistent, with exception to NUREG-1801, Section XI.M36, External Surfaces Monitoring.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1) and Detection of Aging Effects (Element 4)

NUREG-1801, Section XI.M36 requires the program to visually inspect the external surface of in-scope components and monitor external surfaces of steel components in systems within the scope of license renewal and subject to AMR for loss of material and leakage. The External Surfaces Monitoring Program has expanded the materials inspected to include stainless steel, aluminum, copper alloy, and elastomer external surfaces within the scope of license renewal. The use of visual inspection to detect loss of material and leakage of stainless steel, aluminum, copper alloy and elastomer external surfaces is an effective method for these materials.

NUREG-1801, Section XI.M36 requires the program to manage loss of material and leakage. The External Surfaces Monitoring Program also includes, among the aging effects to be managed, elastomer hardening and loss of strength. This aging effect is managed by physical manipulation of elastomer components to detect hardening and loss of strength.

NUREG-1801, Section XI.M36 requires a program of visual inspection to detect loss of material and leakage. The External Surfaces Monitoring Program primarily uses visual inspection to detect loss of material and leakage and is augmented by manipulation of elastomers when appropriate to the component material and design. Manipulation of elastomers is an effective method to augment the visual inspection of elastomers in detecting the aging effect of hardening and loss of strength.

Enhancements

None

Operating Experience

The External Surfaces Monitoring Program is a new program. Routine system walkdowns are performed as part of the systems engineering program. The STP condition reporting program is used in conjunction with the system walkdowns to identify and resolve issues to plant equipment. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801 aging management program. A review of plant condition reporting documents, as well as other STP current licensing basis documents, since 1998, was performed to ensure that there is no unique, plant-specific operating experience in addition to that in NUREG-1801. The review identified no unique operating experience. The condition reporting program was proven to be effective in maintaining the material condition of plant systems.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the External Surfaces Monitoring program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.21 Flux Thimble Tube Inspection

Program Description

The Flux Thimble Tube Inspection program manages loss of material by performing wall thickness eddy current inspection of all flux thimble tubes that form part of the reactor coolant system pressure boundary. The pressure boundary includes the length of the tube inside the reactor vessel out to the seal fittings outside the reactor vessel. Eddy current testing is performed on the portion of the tubes inside the reactor vessel. The program implements the recommendations of NRC Bulletin 88-09, *Thimble Tube Thinning in Westinghouse Reactors*.

The flux thimble tubes are scheduled to be inspected each refueling outage. The inspection may be deferred by using an evaluation that considers the actual wear rate. Wall thickness measurements are trended and wear rates are calculated. If the current measured wear exceeds the acceptance criteria or if the predicted wear (as a measure of percent through wall) for a given flux thimble tube is projected to exceed the established acceptance criteria prior to the next refueling outage, corrective actions are taken to reposition, cap, or replace the tube. Program documentation maintains details regarding the inspections results for each core location and modifications of each thimble tube, such as whether it has been capped, repositioned or replaced. Design changes are also implemented to use more wear-resistant thimble tube materials (e.g., chrome-plated stainless steel). The inspection frequency may be revised as appropriate based upon items such as operating experience and recommendations from the PWR Owner's Group.

NUREG-1801 Consistency

The Flux Thimble Tube Inspection program is an existing program, that following enhancement, will be consistent with NUREG-1801, Section XI.M37, Flux Thimble Tube Inspection.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, enhancements to the Flux Thimble Tube Inspection program from the following program elements will be implemented:

Scope (Element 1), Preventative Actions (Element 2), Parameters Monitored or Inspected (Element 3) and Detection of Aging Effects (Element 4).

A new program procedure will be created that contains provisions to perform a wall thickness eddy current inspection of all flux thimble tubes that form part of the reactor coolant system pressure boundary. The inspections are scheduled for each outage, and may be deferred by using an evaluation that considers the actual wear rate.

Preventative Actions (Element 2), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Corrective Actions (Element 7), Confirmation Process (Element 8), and Administrative Controls (Element 9).

A new program procedure will be created that contains provisions to evaluate flux thimble tube wear by design engineering personnel and perform corrective actions based on evaluation results after each inspection.

Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), Corrective Actions (Element 7), Confirmation Process (Element 8), and Administrative Controls (Element 9).

A new program procedure will be created that contains provisions to trend wall thickness measurements and calculate wear rates by design engineering personnel.

Monitoring and Trending (Element 5), Corrective Actions (Element 7), Confirmation Process (Element 8), and Administrative Controls (Element 9).

A new program procedure will be created that contains provisions to take corrective actions to reposition, cap or replace the tube, if the predicted wear (as a measure of percent through wall) for a given flux thimble tube is projected to exceed the established acceptance criterion prior to the next outage.

Scope (Element 1), Parameters Monitored or Inspected (Element 3) and Acceptance Criteria (Element 6).

A new program procedure will be created that contains provisions to include a description of the testing and analysis methodology and percent through wall acceptance criteria of a maximum of 80 percent through wall loss.

Corrective Actions (Element 7), Confirmation Process (Element 8), and Administrative Controls (Element 9).

A new program procedure will be created that contains provisions to remove flux thimbles from service to ensure the integrity of the reactor coolant system pressure boundary for flux thimble tubes that cannot be inspected over the tube length, that are subject to wear due to restriction or other defect, and that can not be shown by analysis to be satisfactory for continued service.

Operating Experience

In response to NRC Bulletin 88-09, STP implemented the Flux Thimble Tube Inspection program.

All of the flux thimble tubes in STP Unit 1 had an original outer diameter of 0.313 in. and were replaced in September 1989 with thicker tubes having an outer diameter of 0.385 in. The original flux thimble tubes in Unit 2 are the thicker walled 0.385 in. outer diameter tubes. The larger diameter tubes reduce the clearance that allowed for flux thimble tube vibration fretting wear in the original 0.313 in. outer diameter tubes.

Design engineering maintains details regarding the core location, wear location and the number of times a tube has been previously repositioned, capped or replaced. Since the change to the 0.385 in. thimbles, there have been no thimble wear actions necessary for Unit 1. Although all of the thimbles were replaced in Unit 1 in 2003, this was not due to thimble wear, but rather to facilitate the inspection and repair of the reactor vessel bottom nozzles. Corrective actions taken at STP in response to the results of the inspections in Unit 2 included repositioning of thimble tubes and replacing 25 thimble tubes with chrome plated tubes.

The current acceptance criterion for measured flux thimble wear is 80 percent through wall. No measured wear scar in any thimble has exceeded this value.

These corrective actions and the early identification of the aging issues discussed above are objective evidence to support the conclusion that the Flux Thimble Tube Inspection program is effective at managing loss of material of the flux thimble tubes.

Conclusion

The continued implementation of the Flux Thimble Tube Inspection program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.22 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Program Description

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program manages cracking, loss of material, and hardening and loss of strength of the internal surfaces of piping, piping components, ducting and other components that are not inspected by other aging management programs.

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that uses the work control process for preventive maintenance and surveillance to conduct and document inspections. The program performs visual inspections to detect aging effects that could result in a loss of component intended function. Visual inspections of internal surfaces of plant components are performed by qualified personnel during periodic maintenance, predictive maintenance, surveillance testing and corrective maintenance. Supplemental inspections not performed concurrently with planned work activities will be performed. The locations and intervals for these supplemental inspections are based on assessments of the likelihood of significant degradation and on current industry and plant-specific operating experience. Additionally, visual inspections may be augmented by physical manipulation, when appropriate for the component configuration and material, to detect hardening and loss of strength of both internal and external surfaces of elastomers. The program also includes volumetric evaluation (ultrasonic examination) to detect stress corrosion cracking of the internal surfaces of stainless steel components exposed to diesel exhaust.

This program will be initiated prior to entering the period of extended operation and provides for periodic inspection of a selected set of sample components within the scope of this program. The internal surfaces inspections are normally performed through scheduled preventive maintenance and surveillance inspections such that work opportunities are sufficient to detect aging and provide reasonable assurance that intended functions are maintained. Supplemental inspections not performed concurrently with planned work activities will be performed. The locations and intervals for these supplemental inspections will be based on assessments of the likelihood of significant degradation and on current industry and plant-specific operating experience.

NUREG-1801 Consistency

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program that, when implemented, will be consistent with exception to NUREG-1801, Section XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.

Exceptions to NUREG-1801

Program Elements Affected:

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), and Monitoring and Trending (Element 5)

NUREG-1801 Section XI.M38 provides for a program of visual inspections of the internal surfaces of miscellaneous steel piping and ducting components to ensure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. The exceptions to NUREG-1801, Section XI.M38 are an increase to the scope of the materials inspected to include stainless steel, aluminum, copper alloy, stainless steel-cast austenitic, nickel alloys, glass and elastomers, in addition to steel and an increase to the scope of aging effects to include hardening and loss of strength for elastomers. Additionally, visual inspections may be augmented (1) by physical manipulation to detect hardening and loss of strength of elastomers when appropriate for the component configuration and material, and (2) by volumetric evaluation to detect stress corrosion cracking of the internal surfaces of stainless steel components exposed to diesel exhaust.

Enhancements

None

Operating Experience

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is a new program; therefore, plant-specific operating experience to verify the effectiveness of the program is not available. However, visual inspections were conducted during periodic maintenance, predictive maintenance, surveillance testing and corrective maintenance. These records provided evidence of STP using maintenance opportunities to conduct internal inspections during normal plant activities. Industry operating experience that forms the basis for this program is included in the operating experience element of the corresponding NUREG-1801 aging management program. A review of plant condition reporting documents, as well as other STP current licensing basis documents, since 1998, was performed to ensure that there is no unique, plant-specific experience in addition to that in NUREG-1801. The review identified no unique operating experience.

Many of the plant condition reporting documents discussed above concerned corrosion found in HVAC systems. The corrective actions for these conditions generally included removal of the corrosion and painting to prevent recurrence.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.23 Lubricating Oil Analysis

Program Description

The Lubricating Oil Analysis program manages loss of material, and reduction of heat transfer for components within the scope of license renewal that are exposed to lubricating and hydraulic oil. The program includes acceptance criteria based upon vendor and industry guidelines for oil chemical and physical properties and for foreign material such as water contamination. Increased contamination and degradation of oil properties provide an indication of aging of the lubricating or hydraulic oil. Monitoring and trending of lubricating and hydraulic oil properties and particles found within the oil identifies risk to components due to aging prior to loss of intended function.

Plant procedures and offsite analyses implement sampling methods, lubricant test methods and lubricant test data evaluation requirements. Sample schedules are established and managed within the predictive maintenance program.

The One-Time Inspection program (B2.1.16) verifies the effectiveness of the Lubricating Oil Analysis program.

NUREG-1801 Consistency

The Lubricating Oil Analysis program is an existing program that, following enhancement, will be consistent, with exception to NUREG-1801, Section XI.M39 Lubricating Oil Analysis.

Exceptions to NUREG-1801

<u>Program Element Affected:</u>

Parameters Monitored or Inspected (Element 3)

NUREG-1801 states that lubricating oil in components subject to periodic oil changes be tested using particle-counting test methods to detect evidence of abnormal wear rates or excessive corrosion. Analysis of the standby diesel generator oil for total particle count does not yield an accurate count due to the dark color of the oil. In lieu of particle count testing, it is analyzed for metal particles by ferrography on a quarterly basis with results that provide indications as to the amount and type of wear particles contained within the oil. The use of ferrography for wear metals in lieu of particle counting for cleanliness is deemed to provide a greater degree of insight into lubricant condition for the purpose of managing aging.

NUREG-1801 states that oils for components that do not have regular oil changes are to have their flash points determined. Flash point is not determined for sampled oil from the auxiliary feedwater turbine, BOP diesel generator, or feedwater isolation valve (FWIV) hydraulic oil because analysis for particle count, viscosity, total acid/base (neutralization number), water content, and metals content provide sufficient information to verify the oil does not contain water or contaminants that would permit the onset of aging effects. STP monitors the percent fuel dilution in the BOP diesel generator lubricating oil, which is a more accurate method than flash point for identifying fuel leaks and oil dilution. If fuel dilution test results are > 2.5 percent, confirmation can be determined by analyzing the sample for flash point.

Enhancements

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

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to require analysis for particle count of the lubricating oil for the centrifugal charging pump.

Acceptance Criteria (Element 6)

Procedures will be enhanced to require that sample analysis data results, for which no acceptance criteria is specified, be evaluated and trended against baseline data and data from previous samples to determine the acceptability of oil for continued use.

Operating Experience

STP has an Operating Experience (OE) Program that monitors industry issues and assesses these for applicability to its own operation. The STP Corrective Action Program (CAP) is used to track, trend, and evaluate plant issues. The Lubricating Oil Analysis program ensures that the oil environment in the mechanical systems is maintained to the required quality. The Lubricating Oil Analysis program maintains oil systems contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material, cracking or reduction of heat transfer. Lubricating oil testing activities include sampling and analysis of lubricating oil for detrimental contaminants.

The following condition report samples indicate that the Lubricating Oil Analysis Program is routinely monitored and evaluated:

Feedwater Isolation Valves (FWIV) Hydraulic Oil:

Oil analysis test results for several FWIVs indicated high particulate and/or high water content. Corrective actions included changing the filtration unit filters, verifying proper sample techniques, repairing/replacing the reservoir pressure relief valve, and replacing the reservoir oil. Within approximately a year, FWIV oil parameters were back within specification (with one exception, believed to be due to bad seals associated with the EHC high efficiency filter unit pump). The frequency of FWIV hydraulic skid filtration unit filter replacement and filtration skid suction strainer cleaning was returned to on-demand.

Pressure Operated Relief Valve (PORV) Hydraulic Oil:

Oil analysis test results for PORV 2C indicated high water content. Corrective actions included replacing the oil, cleaning and inspecting the reservoir, replacing the reservoir gaskets, and ensuring the fasteners were tight. Trouble-shooting resulted in the repair of a leaking desiccant receiver and inspection for water. Subsequent test results were satisfactory.

Oil analysis test results for PORV 2C indicated high particulate content:

Corrective actions included oil replacement. Subsequent test results were satisfactory.

Reactor Coolant Pump (RCP) Lower Motor Bearing Oil:

Oil analysis test results for RCP 1A and 1B indicated high particulate content. Corrective actions included oil replacement. Subsequent test results were satisfactory.

Condenser Vacuum Pump 13 Speed Reducer Gearbox Oil:

Oil analysis test results indicated high acid content. Corrective actions included oil replacement. Subsequent test results were satisfactory.

Main Turbine Lube Oil Reservoir Oil:

Oil analysis test results indicated high water content. Corrective actions included processing the oil until the test results were in specification.

Based on this review of STP operating experience, degradation of lubricating oil that has been identified has been consistent with industry experience and those identified in NUREG-1801. STP has effectively monitored and trended abnormal oil conditions. Appropriate corrective actions have been taken, including increasing sampling frequencies, filtering oil systems, changing oil filters, replacing oil, physical inspections, and repair. As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the Condition Reporting Process or the Operating Experience program.

Conclusion

The continued implementation of the Lubricating Oil Analysis program, supplemented by the One-Time Inspection program (B2.1.16), provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.24 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages embrittlement, melting, cracking, swelling, discoloration, electrical failure, and loss of dielectric strength leading to reduced insulation resistance (IR) to ensure that electrical cables, connections, and terminal blocks not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended functions. Technical information contained within SAND 96-0344 and EPRI TR-1013475 was used to determine the service limitations of the cable, connection and terminal block insulating materials. SAND 96-0344 and EPRI TR-109619 provide guidance on techniques for visually inspecting cables, connections and terminal blocks for aging.

Non-EQ cables, connections and terminal blocks within the scope of license renewal in accessible areas with an adverse localized environment are inspected. Connection insulation material includes termination kits and tape used to insulate splices that are normally located within junction boxes and terminal blocks located within terminal boxes. The inspections of non-EQ cables, connectors and terminal blocks in accessible areas are representative, with reasonable assurance, of cables, connections and terminal blocks in inaccessible areas with an adverse localized environment. At least once every 10 years, non-EQ cables, connections and terminal blocks within the scope of license renewal in accessible areas with an adverse localized environment are visually inspected for embrittlement, melting, cracking, swelling, surface contamination, or discoloration. The first inspection will be completed prior to the period of extended operation.

The acceptance criterion for visual inspection of accessible non-EQ cable jacket, connection, and terminal block insulating material is the absence of anomalous indications that are signs of degradation. Corrective actions for conditions that are adverse to quality are performed in accordance with the corrective action program as part of the QA program. The corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

NUREG-1801 Consistency

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program that, when implemented, will be consistent with NUREG-1801, Section XI.E1, Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program and, as such, no programmatic operating experience is available.

A review of plant-specific operating experience was conducted. STP performs periodic insulation resistance tests and has replaced several cables prior to failure. Regular maintenance inspections have identified insulation cracking, embrittlement, and bubbling which were repaired with no loss of function.

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of the Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.25 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages localized damage and breakdown of insulation leading to electrical failure of inaccessible medium-voltage cables exposed to adverse localized environments caused by significant moisture, (moisture which lasts more than a few days) simultaneously with significant voltage, (energized greater than 25 percent of the time) to ensure that inaccessible medium voltage cables not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, and within the scope of license renewal are capable of performing their intended function. This program considers the technical information and guidance provided in NUREG/CR-5643, *Insights Gained From Aging Research*, IEEE Std. P1205, *IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations*, SAND 96-0344, *Aging Management Guideline for Commercial Nuclear Power Plants – Electrical Cable and Terminations*, and EPRI TR-109619, *Guideline for the Management of Adverse Localized Equipment Environments.*

All cable manholes that contain in-scope non-EQ inaccessible medium voltage cables are inspected for water collection. Any collected water is removed as required. This inspection and water removal is performed based on actual plant experience with the inspection frequency being at least once every two years. Solar powered sump pumps provide for removal of water from some manholes prior to accumulation.

All in-scope non-EQ inaccessible medium voltage cables routed through manholes are tested to provide an indication of the conductor insulation condition. A polarization index test as described in EPRI TR-103834-P1-2, *Effects of Moisture on the Life of Power Plant Cables* or other testing that is state-of-the-art at the time of the testing is performed at least once every 10 years. The first test will be completed prior to the period of extended operation.

NUREG-1801 Consistency

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.E3, Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1)

Procedures will be enhanced to identify the cables and manholes that are within the scope of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program.

Preventive Actions (Element 2) and Detection of Aging Effects (Element 4)

Procedures will be enhanced to require that the cable manholes be inspected for water collection based on plant experience. The enhancement requires that the inspection frequencies for all in-scope manholes be at least once every two years. The enhancement requires any manholes containing water be pumped dry, the source of the water is investigated, and the inspection frequency increased based on past experience.

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to require all in-scope non-EQ inaccessible medium voltage cables exposed to significant moisture simultaneously with significant voltage be tested to provide an indication of the conductor insulation condition.

Acceptance Criteria (Element 6)

Procedures will be enhanced to require that the acceptance criteria be defined prior to each test for the specific type of test performed and the specific cable tested.

Corrective Actions (Element 7)

Procedures will be enhanced to require an engineering evaluation that considers the age and operating environment of the cable be performed when the test acceptance criteria are not met.

Operating Experience

Industry operating experience has shown that cross linked polyethylene or high molecular weight polyethylene insulation materials, exposed to significant moisture and voltage, are most susceptible to water tree formation. Formation and growth of water trees varies directly with operating voltage.

Site-specific operating experience has shown that STP has not experienced a failure of any in-scope inaccessible medium voltage cables. A review of the plant operating experience indicates that STP has experienced a situation in which water was leaking into the Unit 2 cable vault and electrical auxiliary building battery rooms. The source of the water was determined to be a series of manholes leading into the rooms. The cause of the water in the manholes was discovered to be a result of damaged manhole covers as well as temporary power cable installation where the sump cover was propped open for an extended period of time. In addition, STP has experienced a recurring groundwater incursion to some manholes. Solar powered sump pumps have been installed in the affected manholes and have been found effective in preventing cable exposure to significant moisture.

STP is developing a cable management program. The development of the program is ongoing utilizing guidance from EPRI 1020805, *Aging Management Guidance for Medium Voltage Cable Systems for Nuclear Power Plants* and EPRI 1020804, *Aging Management Development Guidance for AC and DC Low-Voltage Power Cable Systems for Nuclear Power Plants*. STP is also assessing guidance provided by NUREG/CR-7000, *Essential Elements of an Electric Cable Condition Monitoring Program,* draft Regulatory Guide DG-1240, *Condition Monitoring for Electric Cables Used in Nuclear Power Plants*, and preliminary NUREG-1801, *Generic Aging Lessons Learned,* Revision 2.

As additional industry and applicable plant-specific operating experience becomes available, the operating experience will be evaluated and appropriately incorporated into the program through the STP corrective action and operating experience programs. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The continued implementation of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.26 Metal Enclosed Bus

Program Description

The Metal Enclosed Bus program manages aging of in-scope non-segregated phase and isolated phase bus. The metal enclosed buses (MEBs) within the scope of this program are the MEBs that are used during station blackout recovery.

The non-segregated phase portion of the program manages loosening of bolted connections, embrittlement, cracking, melting, swelling, discoloration of insulation, electrical failure, loss of dielectric strength leading to reduced insulation resistance (IR), loss of material of bus enclosure assemblies, and hardening and loss of strength of boots and gaskets, and cracking of internal bus supports to ensure that non-segregated phase buses within the scope of license renewal are capable of performing their intended function. A sample of the non-segregated phase bus accessible bolted connections will be inspected for loose connections using thermography.

All non-segregated phase bus sections will be inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulation will be inspected for signs of embrittlement, cracking, melting, swelling, or discoloration, which may indicate overheating or aging degradation. The internal bus supports will be inspected for structural integrity and signs of cracks. The bus enclosure assemblies will be inspected for loss of material due to corrosion and hardening of boots and gaskets.

The isolated-phase portion of the program manages the effects of cracking and loss of material of bus enclosure assemblies, hardening of boots and gaskets, and cracking of internal bus supports to ensure that isolated phase metal enclosed buses within the scope of license renewal are capable of performing their intended function.

Internal portions of isolated phase buses are visually inspected for cracks, corrosion, foreign debris, excessive dust buildup, and evidence of water intrusion. The bus insulators are inspected for signs of embrittlement, cracking, melting, swelling, hardening or discoloration, which may indicate overheating or aging degradation. The internal bus supports are inspected for structural integrity and signs of cracks. The bus enclosure assemblies are inspected for loss of material due to corrosion and hardening of boots and gaskets.

NUREG-1801 Consistency

The Metal Enclosed Bus program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.E4, Metal Enclosed Bus.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1), Preventive Actions (Element 3), Detection of Aging Effects (Element 4), Acceptance Criteria (Element 6), and Corrective Actions (Element 7)

The existing bus inspection activities for inspection and testing of the MEBs will be proceduralized to identify license renewal scope, specific bus inspections requirements, and aging effects to be inspected for, frequencies of inspections, acceptance criteria, and actions to be taken when acceptance criteria are not met.

Operating Experience

Industry experience has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Experience has also shown that bus connections in the MEBs exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads. NRC Information Notices IN 2000-14' *Non-Vital Bus Fault Leads to Fire and Loss of Offsite Power* and IN 89-94, *Electrical Bus Failures* are examples of non-segregated bus duct failures.

A review of the plant operating experience has determined that there has been no aging-related degradation that resulted in the loss of intended function of the MEBs. Sections of the MEBs are inspected every outage; the iso-phase bus is inspected every outage, and the non-segregated bus is inspected every third outage. Thermography is performed on the non-segregated bus at the switchgear once a year. The inspection results for the MEB during the last 10 years have revealed only one instance of insulation installation which required rework, and one instance where repairs to cracked Noryl sleeving have been made. No occurrences of corrosion, loss of material, hardening, foreign debris, excessive dust buildup, water intrusion or overheating have been found.

As additional Industry and applicable plant-specific operating experience become available, the operating experience will be evaluated and appropriately incorporated into the program through the STP quality assurance program. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

Conclusion

The continued implementation of the Metal Enclosed Bus program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.27 ASME Section XI, Subsection IWE

Program Description

The ASME Section XI, Subsection IWE program manages cracking, loss of material, loss of sealing, and leakage through containment by providing aging management of the steel liner of the concrete containment building. IWE inspections are performed in order to identify and manage containment liner aging effects that could result in loss of intended function. Included in this inspection program are the containment liner plate and its integral attachments, containment hatches and airlocks, and pressure-retaining bolting. Pressure retaining containment seals and gaskets are not addressed by the 2004 Edition of ASME Section XI, Subsection IWE (no addenda). The aging effects of these components are managed by the 10 CFR Part 50, Appendix J program (B2.1.30). Acceptance criteria for components subject to IWE examination requirements are specified in Article IWE-3000.

Surface and volumetric examinations are performed to identify indications of degradation. The primary inspection method is a general visual examination (VT-3 and VT-1). Ultrasonic thickness measurements are performed, as required. All areas requiring augmented examination per criteria IWE-1240 and IWE-2420 receive a detailed visual inspection.

For the second containment inspection interval commencing September 9, 2009, STP performs IWE containment inservice inspections in accordance with the 2004 Edition of ASME Section XI, Subsection IWE (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2)(ix). This program is consistent with provisions in 10 CFR 50.55a that specify use of the ASME Code edition in effect 12 months prior to the start of the inspection interval. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWE program is an existing program that is consistent, with exception to NUREG-1801, Section XI.S1, ASME Section XI, Subsection IWE.

Exceptions to NUREG-1801

<u>Program Elements Affected:</u>

Scope of Program (Element 1)

NUREG-1801 specifies that ASME Section XI, Subsection IWE inspections include pressure retaining containment seals and gaskets. These components are not addressed by the 2004 Edition of ASME Section XI, Subsection IWE (no addenda). The aging effects of these components are managed by the 10 CFR 50, Appendix J program (B2.1.30).

Parameters Monitored or Inspected (Element 3)

NUREG-1801 states that Table IWE-2500-1 specifies seven categories for examination. The STP ASME Section XI, Subsection IWE program will be in accordance with the 2004 Edition of the ASME Section XI, Subsection IWE (no addenda). This edition of the code does not specify the seven categories for examination in Table IWE-2500-1.

Monitoring and Trending (Element 5)

According to ASME Section XI, Paragraphs IWE-2420(b) and (c), flaws or areas of degradation that have been accepted by engineering evaluation shall be reexamined during the next inspection period, and if they are found to remain essentially unchanged for this inspection period, these areas no longer require augmented examination. This is not consistent with Element 5, which requires that they remain essentially unchanged for three consecutive inspection periods.

IWE-2430 was deleted prior to the issuance of the 2004 Edition of ASME Section XI, (no addenda). The changes to Table IWE-2500-1 eliminate several examination categories. The categories that remain all require 100 percent examination. Therefore no items are available for additional examinations.

Acceptance Criteria (Element 6), Corrective Actions (Element 7), and Confirmation Process (Element 8)

Table IWE-3410-1 was deleted prior to the issuance of the 2004 Edition of ASME Section XI, (no addenda). The acceptance standards previously specified in Table IWE-3410-1 are now given in Section IWE-3500.

Enhancements

None

Operating Experience

STP procedures have confirmed that the components of containment liners are capable of performing their intended functions.

The containment liners for both Units are inspected per the ASME Section XI, Subsections IWE programs. Exams are conducted every refueling outage, when necessary, to meet the frequency requirements of once per period of 3 1/3. The most recent examination results for the Unit 1 and 2 containment liners were found to be acceptable and no indication were found that would result in loss of the containment liner intended function.

Based on a review of 10 years of STP operating experience, no significant degradation or corrosion of the components of containment liners have been identified. In 2000, areas of minor surface corrosion were identified on Unit 2 containment building liner plate at the interface of liner and concrete basemat, randomly spaced along the circumference of the building. No pitting of the liner plate was identified. Repairs of these areas have been completed. The STP operating experience findings are consistent with those identified in NUREG-1801. Therefore, the ASME XI, Subsection IWE program has been effective in ensuring that the STP components of containment liners will continue to operate within the current licensing basis.

Conclusion

The continued implementation of the ASME Section XI, Subsection IWE program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.28 ASME Section XI, Subsection IWL

Program Description

The ASME Section XI, Subsection IWL program manages the following aging effects of the concrete containment building and post-tensioned system:

- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity, permeability
- Loss of material
- Loss of material (spalling, scaling) and cracking

For the current inspection interval, STP will perform IWL Containment Inservice Inspections (CISIs) in accordance with the 2004 Edition of ASME Section XI, Subsection IWL (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2). This program will be consistent with provisions in 10 CFR 50.55a that specify use of the ASME Code edition in effect 12 months prior to the start of the inspection interval. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

The ASME Section XI, Subsection IWL inspections will be performed in order to identify and manage containment concrete aging effects that could result in loss of intended function. Included in this inspection program are the concrete containment structure (includes all accessible areas of the concrete dome, cylinder walls, and buttresses) and the post-tensioning system (includes tendons, end anchorages, and concrete surfaces around the end anchorages). A summary of the containment concrete components at STP, the examinations required, and a detailed schedule of examinations for items subject to IWL inspections are provided in plant procedures. The primary inspection method is a general visual examination (VT-3C, VT-1, and VT-1C). Tendon wires will be tested for yield strength, ultimate tensile strength, and elongation. Tendon corrosion protection medium will be analyzed for alkalinity, water content, and soluble ion concentrations. Prestressing forces will be measured in selected sample tendons. Evaluation of prestressing forces is addressed in Concrete Containment Tendon Prestress program (B3.3). Acceptance criteria, corrective actions, and expansion of the inspection scope when degradation exceeding the acceptance criteria is found, are in accordance with ASME Section XI, Subsection IWL.

In conformance with 10 CFR 50.55a(g)(4)(ii), the STP CISI program will be updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWL program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S2, ASME Section XI, Subsection IWL.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), Corrective Actions (Element 7), Confirmation Process (Element 8), and Administrative Controls (Element 9)

Procedures will be enhanced to incorporate the 2004 Edition of ASME Section XI, Subsection IWL (no addenda), supplemented with the applicable requirements of 10 CFR 50.55a(b)(2).

Operating Experience

STP specifications require that the inservice surveillance of the post tensioning system for each of the containments shall be performed one, three, and five years after the initial structural integrity test and every five years thereafter. Each unit will be examined on an alternating 10 year cycle as specified in IWL-2421. At each five year surveillance interval, a physical surveillance is done in one unit and a visual examination (IWL-2510, IWL-2524, IWL-2525) is completed in both units.

IWL-2510 was performed most recently at the 15th year surveillance in 2003 (Unit 2) and during the 20th year surveillance completed in 2009 (Unit 1). Upon receipt of NRC Information Notice 2010-14 in August 2010, the failure to perform IWL-2510 in Unit 2 during the 20th year surveillance was treated as a missed surveillance and appropriate corrective action was initiated in accordance with the STP Corrective Action Program. Future surveillances will perform IWL-2510 in both units every five years.

The 15th year tendon surveillance began on October 27, 2003 and was completed on February 7, 2004. Based on the data gathered during the 2003 visual inspection on both units and physical inspection on Unit 2, the conclusion was reached that no abnormal degradation of the post tensioning system had occurred at the STP Units 1 and 2 containment buildings.

The 20th year tendon surveillance began on December 11, 2008 and was completed on January 21, 2009. Based on the data gathered during the 2008 and 2009 visual inspections of both units and physical inspection of Unit 1, the conclusion was reached that no abnormal degradation of either post tensioning system had occurred.

The STP ASME Section XI, Subsection IWL program provides confidence in the condition and functional capability of the system, and an opportunity for timely corrective measures if adverse conditions are detected. The STP ASME Section XI, Subsection IWL operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the ASME Section XI, Subsection IWL program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.29 ASME Section XI, Subsection IWF

Program Description

The ASME Section XI, Subsection IWF program manages loss of material, cracking, and loss of mechanical function for supports of Class 1, 2, and 3 piping and components. There are no Class MC supports at STP. The program conforms to Inspection Program B of ASME Section XI. During the third inservice inspection interval (September 2010 to September 2020 for Unit 1 and October 2010 to October 2020 for Unit 2), STP will perform inspections of supports for Class 1, 2, and 3 piping and components in accordance with 2004 Edition with no addenda of ASME Section XI. In conformance with 10 CFR 50.55a(g)(4)(ii), the STP ISI program is updated during each successive 120-month inspection interval to comply with the requirements of the latest edition and addenda of the Code specified 12 months before the start of the inspection interval. STP will use the ASME Code edition consistent with the provisions of 10 CFR 50.55a during the period of extended operation.

Supports for Class 1, 2, and 3 piping and components are selected for examination per the requirements of ASME Section XI, Subsection IWF. Acceptance standards are specified in Article IWF- 3400. Scope of the inspection for supports is based on class and total population as defined in Table IWF-2500-1. When a component support requires corrective measures in accordance with the provisions of IWF-3112.2 or IWF-3122.2, that support is reexamined during the next inspection period. When the reexaminations do not require additional corrective measures during the next inspection period, the inspection schedule reverts to the requirements of the original inspection program. Component support examinations that detect flaws or relevant conditions exceeding the acceptance criteria of IWF-3400 are extended to include additional examinations in accordance with IWF-2430.

The ASME Section XI, Subsection IWF program provides a systematic method for periodic examination of supports for Class 1, 2, and 3 piping and components. The primary inspection method is visual examination. The instructions and acceptance criteria for the visual examinations are included in STP plant procedures.

NUREG-1801 Consistency

The ASME Section XI, Subsection IWF program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S3, ASME Section XI Subsection IWF.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1), Parameters Monitored or Inspected (Element 3), Detection of Aging Effects (Element 4), Monitoring and Trending (Element 5), Acceptance Criteria (Element 6), Corrective Actions (Element 7)

Procedures will be enhanced to incorporate the 2004 Edition of ASME Section XI, Subsection IWF (with no addenda).

Operating Experience

Performance of inservice inspections in accordance with plant procedures has confirmed that the supports for Class 1, 2, and 3 piping and components are capable of performing their intended functions. Review of 10 years of plant-specific operating experience has not identified any program adequacy or implementation issues with the STP ASME Section XI, Subsection IWF program. Industry operating experience is evaluated by STP for relevancy to STP, and appropriate actions are taken and documented. Based on these results, the STP ASME Section XI, Subsection IWF program is effective in monitoring ASME Class 1, 2 and 3 component supports and detecting aging effects prior to loss of intended function.

A review of the 2RE13 outage summary report concluded with four relevant IWF conditions that required evaluation for continued service and were marked for repair/replacement. Two ASME Class 1 support spring cans were found with out of tolerance load readings and one with an out of plate reading. There was also one ASME Class 3 support found with corroded bolts. A review of 1RE14 (April 2008) showed no items with flaws.

The ASME Section XI, Subsection IWF program at STP is updated to account for industry operating experience. ASME Section XI is also revised every three years and addenda are issued in the interim, which allows the code to be updated to reflect industry operating experience. The requirement to update the ASME Section XI, Subsection IWF program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the ASME Section XI, Subsection IWF program reflects enhancements due to operating experience that have been incorporated Into ASME Section XI.

Therefore, the ASME Section XI, Subsection IWF program operating experience information provides objective evidence to support the conclusion that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the ASME Section XI, Subsection IWF program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.30 10 CFR Part 50, Appendix J

Program Description

The 10 CFR Part 50 Appendix J program manages cracking, loss of material, loss of leak tightness, loss of sealing, and leakage through containment to assure leakage through the primary containment, and systems and components penetrating the primary containment, does not exceed allowable leakage rate limits specified in the Technical Specifications. The 10 CFR Part 50 Appendix J program does not prevent degradation due to aging effects but provides measures for monitoring to detect the degradation prior to the loss of intended function. Periodic monitoring of leakage from the containment, containment isolation valves, and containment penetrations assures proper maintenance and repairs can be performed prior to the loss of intended function. The 10 CFR Part 50 Appendix J program establishes compliance with the regulations and guidance provided in 10 CFR Part 50 Appendix J, *Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors* (Option B); Regulatory Guide 1.163, *Performance-Based Containment Leak-Testing Program*; NEI 94-01, *Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J*; and ANSI/ANS 56.8, *Containment System Leakage Testing Requirements*.

NUREG-1801 Consistency

The 10 CFR Part 50 Appendix J program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S4, 10 CFR Part 50 Appendix J.

Exceptions to NUREG-1801

None

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the following program element:

Corrective Actions (Element 7)

Procedures will be enhanced to specify a surveillance frequency of 10 years following a successful Type A test.

Operating Experience

STP most recent Type A tests for each unit are as follows. STP maximum allowable leakage rate (La) at test pressure is 0.3 percent of containment air by weight per day (wt%).

Unit 1

Date of last Type A test: 10/5/09

As-Found Leakage: 0.1180 wt%

Approximate date of next Type A test: 2019

Unit 2

Date of last Type A test: 5/5/07

As-Found Leakage: 0.1423 wt%

Approximate date of next Type A test: 2017

Types B and C leakage are listed below in terms of standard cubic centimeters per minute (sccm). The min path from as found tests is represented by AF; the min path from as left conditions is represented by AL.

Unit 1

Max Path	Min Path AF	Min Path AL
94655.3	21380.6	21196.1

Unit 2

Max Path	Min Path AF	Min Path AL
98717.2	40120	32911

STP allowable B and C leakage (0.6 La) is 455,050 sccm. As a percentage of 0.6 La that makes the above values:

Unit 1

Max Path	Min Path AF	Min Path AL
20.8%	4.7%	4.7%

Unit 2

Max Path	Min Path AF	Min Path AL
21.7%	8.8%	7.2%

STP also has an administrative maintenance limit of 200,000 sccm. As a percent of this value, then:

Unit 1

Max Path	Min Path AF	Min Path AL
47.3%	10.7%	10.6%

Unit 2

Max Path	Min Path AF	Min Path AL
49.4%	20.1%	16.456%

The results of these tests show that the STP containment leakage rates are well below the allowable rates for all tests. Type A rates are less than half the maximum allowable leakage rate at test pressure. Type B and C leakage is less than one fourth of the maximum allowable and less than half of the administrative maintenance limit.

Conclusion

The continued implementation of the 10 CFR Part 50, Appendix J program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.31 Masonry Wall Program

Program Description

The Masonry Wall Program manages cracking of masonry walls, as well as degradation of the structural steel restraint systems of the masonry walls. The Masonry Wall Program is integrated and administered as part of the Structures Monitoring Program (B2.1.32) that implements structures monitoring requirements as specified by 10 CFR 50.65 (Maintenance Rule). In Seismic Category I structures, masonry walls are within scope of license renewal based on guidance provided in IE Bulletin 80-11, *Masonry Wall Design* and NRC Information Notice 87-67, *Lessons Learned from Regional Inspections of Licensee Actions in Response to NRC IE Bulletin 80-11*. Some masonry walls in Non-Category I structures are in-scope for license renewal based on UFSAR commitments to satisfy fire protection requirements. The guidance of NRC Bulletin 80-11 does not apply to these walls. See the Fire Protection program (B2.1.12) for aging management of the masonry wall fire barriers intended function.

The Masonry Wall Program contains inspection guidelines and lists attributes that cause aging of masonry walls, which are to be monitored during structural monitoring inspections, as well as establishes examination criteria, evaluation requirements, and acceptance criteria. The provisions of the program are consistent with the guidance provided in NRC Information Notice 87-67 for inspections and evaluation of masonry wall cracking in Category I structures not addressed in the evaluation basis in response to NRC Bulletin 80-11.

Concrete Masonry Unit (CMU) walls in proximity to safety-related systems and equipment such that wall failure could adversely affect the safety-related systems or equipment are designed as reinforced CMU walls, and/or restrained with steel framing provided on both faces of the walls to prevent collapse of the units. Removable CMU walls, which are built with masonry or concrete units stacked without any grouting or reinforcing, are also restrained with steel framing on both faces of the wall. Some of these removable walls are constructed with reinforced concrete panels, which are evaluated as concrete elements in the Structures Monitoring Program (B2.1.32). No safety-related piping systems or equipment are attached to the CMU walls.

NUREG-1801 Consistency

The Masonry Wall Program,, is an existing program that is consistent with NUREG-1801, Section XI.S5, Masonry Wall Program.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Structures Monitoring Program (B2.1.32), which includes the Masonry Wall Program, has been effective in controlling cracking and various types of aging effects that could invalidate the evaluation basis. The walkdowns conducted as part of the Structures Monitoring Program (B2.1.32) inspect and monitor a number of attributes to masonry walls that are consistent with recommendations delineated in NRC Information Notice 87-67 that ensure the intended functions of all masonry walls within scope of license renewal are maintained for the period of extended operation.

The baseline evaluation of maintenance rule observations was completed in March 1998. Aging Effects were observed in masonry walls in the mechanical auxiliary building and turbine generator building. There was one wall missing only a partial block in the Unit 1 mechanical auxiliary building. This deficiency was evaluated out as Acceptable. Through the subsequent inspections, all masonry walls were found to be in good condition with their structural integrity and functional intent in compliance with their design criteria. One recent condition report describing cracking of a fire wall in the turbine generator building was evaluated as a ”condition not adverse to quality.” A work order was issued to repair the cracking per plant procedures.

At STP, all areas of degradation identified during the structures monitoring inspections are documented in condition reports and work orders issued prior to any loss of intended functions or invalidation of licensing basis. The STP Masonry Walls Program operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Masonry Wall Program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.32 Structures Monitoring Program

Program Description

The Structures Monitoring Program (SMP) monitors the condition of structures and structural supports that are within the scope of license renewal to manage the following aging effects:

- Concrete cracking and spalling
- Cracking
- Cracking due to expansion
- Cracking, loss of bond, and loss of material (spalling, scaling)
- Cracks and distortion
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling)
- Increase in porosity and permeability, loss of strength
- Loss of material
- Loss of material (spalling, scaling) and cracking
- Loss of mechanical function
- Loss of sealing
- Reduction of concrete anchor capacity

The SMP implements the requirements of 10 CFR 50.65, *The Maintenance Rule*, consistent with guidance of NUMARC 93-01, *Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2 and Regulatory Guide 1.160, *Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,* Revision 2.

The SMP provides inspection guidelines and walk-down checklists for structural steel, roof systems, reinforced concrete, masonry walls and metal siding. Electrical duct banks and manholes, valve pits, access vaults, and structural supports are inspected as part of the SMP. STP is committed to Regulatory Guide 1.127 and the scope of the SMP includes water-control structures. The scope of SMP also includes masonry walls. The SMP monitors settlement for each major structure utilizing geotechnical monitoring techniques, with benchmarks installed on major structures to allow for monitoring of heave and settlement movements during plant operation. The SMP will monitor groundwater, at least two samples every five years for pH, excessive chlorides and sulfates. STP does not take credit for any coatings to manage the aging of structural components, and coating degradation is used only as an indicator of the condition of underlying material.

NUREG-1801 Consistency

The Structures Monitoring Program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S6, Structures Monitoring Program.

Exceptions to NUREG-1801

None

Enhancements

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

Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to specify inspections of seismic gaps, caulking and sealants, duct banks and manholes, valve pits and access vaults, doors, electrical conduits, raceways, cable trays, electrical cabinets/enclosures and associated anchorage.

Procedures will be enhanced to monitor at least two groundwater samples every five years for pH, sulfates, and chloride concentrations.

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify inspection intervals so that all accessible areas of both units are inspected every ten years.

Procedures will be enhanced to specify inspector qualifications in accordance with ACI 349.3R-96.

Operating Experience

The STP SMP began with a baseline walkdown inspection in 1997. The examination included a careful walkdown and visual examination of accessible areas in the scoped structures. All the structures were found to be acceptable with the exception of the Unit 1 fuel handling building, room 011, which had a significant water leak resulting in corrosion of structural steel columns. The columns were recoated in 1997. The area of the fuel handling building was classified as “acceptable with deficiencies” because the structure continued to function as designed, but was subject to periodic inspections to verify water level was being adequately controlled and structural coatings had been reapplied to control corrosion.

Subsequent Maintenance Rule structures inspections in 2002-03 concluded that all Maintenance Rule scoped structures were meeting their established (a)(2) performance criteria. The only aging related condition report noted an inundation problem in Unit 2 similar to the one that was found in the Unit 1 fuel handling building, room 011, during the baseline inspections. The problem persisted through 2004; and in 2005 gravity drains were installed similar to the ones installed in Unit 1.

At STP, all areas of degradation identified during the structures monitoring inspections are documented in condition reports and work orders issued prior to any loss of intended functions or invalidation of licensing basis. The STP Structures Monitoring Program operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Structures Monitoring Program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.33 RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants

Program Description

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, which is implemented as part of the Structures Monitoring Program (SMP), manages cracking, loss of bond, loss of material (spalling, scaling), cracking due to expansion, increase in porosity and permeability, loss of strength, and loss of form by performing inspection and surveillance activities for all water control structures associated with emergency cooling water systems. STP is committed to conform to the intent of RG 1.127 with respect to the essential cooling pond (ultimate heat sink). The Structures Monitoring Program (B2.1.32) in compliance with 10 CFR 50.65, *The Maintenance Rule*, includes all water control structures within the scope of RG 1.127, as evaluated in NUREG-1801. The essential cooling pond, the essential cooling pond intake structure, and the essential cooling pond discharge structure are the water-control structures within the scope of license renewal that are monitored by this program. The essential cooling pond (ultimate heat sink) receives periodic monitoring of its hydraulic and structural condition, which includes evaluation of erosion inhibiting structures, conditions of benchmarks and piezometers, and measuring the essential cooling pond volume as indicative of any sediment accumulation. Additionally, STP performs a seepage rate evaluation for the essential cooling pond every five years.

NUREG-1801 Consistency

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program, is an existing program that, following enhancement, will be consistent with NUREG-1801, Section XI.S7, RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants.

Exceptions to NUREG-1801

None

Enhancements

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

Detection of Aging Effects (Element 4)

Procedures will be enhanced to specify inspections at intervals not to exceed five years or to immediately follow significant natural phenomena.

Operating Experience

A review of the structures monitoring inspection documents shows that the water control structures at STP including the essential cooling pond, ECW intake and ECW discharge structures have been subject to relatively few aging effects. These inspections include scheduled structures monitoring inspections and detailed visual inspections of the essential cooling pond. All structures have always been in acceptable condition and met engineering functional requirements including performance, maintainability, and safety.

Essential cooling pond inspection report from 1997 states measurements of pond volume over the years have indicated virtually no accumulation of sediments within the pond. The differential settlements of the ECW intake structure and ECW discharge structure were well within the allowable limit of ¾ in. The deflections measured along buried ECW pipe routes using benchmark elevations were found to be well within allowable of 1.5 in. All of the essential cooling pond benchmarks and piezometers were found to be fully functional and measurements were being taken as specified in the UFSAR. There was an array of shrinkage cracks running longitudinal along the soil-cement and concrete paved exterior slopes of embankments, however, this was attributed due to the fluctuating moisture contents of the soil within and as such did not exhibit any signs of erosion

Two minor potential consequences of growing vegetation around the essential cooling pond slopes have been identified. The potential for cracking of areas with soil-cement and concrete leading to soil erosion and the issue of clogging (owing to soil and vegetation) possibly leading to entrapping of debris near the trash racks of the ECWIS was identified. These conditions are non-aging related and could easily be fixed by regular herbicide application.

Conclusion

The continued implementation of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.34 Nickel-Alloy Aging Management Program

Program Description

The Nickel-Alloy Aging Management Program manages cracking due to primary water stress corrosion cracking (PWSCC) in reactor coolant system locations that contain Alloy 600.

The scope of the Nickel-Alloy Aging Management Program consists of the reactor coolant pressure boundary components that contain Alloy 600.

The term Alloy 600 is used throughout this program to represent nickel-alloy 600 material and nickel-alloy 82/182 weld metal. Non-Alloy 600 nickel components (e.g., Alloy 690 or welds made of Alloy 52/152) are not included in this program, but are subject to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B2.1.1) requirements. The penetration nozzles welded to the upper reactor vessel closure heads, which do not contain Alloy 600, are subject to the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program (B2.1.5).

The Nickel-Alloy Aging Management Program uses inspections, mitigation techniques, repair/replace activities and monitoring of operating experience to manage the aging of Alloy 600 at STP. Detection of indications is accomplished through a variety of examinations (bare metal visual, surface, and volumetric examinations) consistent with ASME Section XI Subsection IWB, ASME Code Case N-722, and EPRI Report 1010087 (MRP-139) issued under NEI 03-08 protocol. Mitigation techniques are implemented, when appropriate, to preemptively remove conditions that contribute to PWSCC. Repair/replacement activities are performed to proactively remove or overlay Alloy 600 material, or as a corrective measure in response to an unacceptable flaw in the material. Operating experience has been reviewed and is continually monitored to provide improvements and modifications to the Nickel-Alloy Aging Management Program as needed.

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants* are provided below.

Scope of Program (Element 1)

All Alloy 600 locations within the reactor coolant system are included in the scope of this program. The term Alloy 600 will be used throughout this program to represent nickel-alloy 600 material and nickel-alloy 82/182 weld metal.

The Nickel-Alloy Aging Management Program identifies the following Alloy 600 locations:

a) Reactor Pressure Vessel:

1. Bottom Head Penetrations:

   BMI penetration tubes, J-groove welds, and tube to thimble guide tube welds (58)

2. Recirculating (Main Loop) Nozzles:

   Hot leg nozzle buttering and butter to safe end welds (4)

   Cold leg nozzle buttering and butter to safe end welds (4)

3. Monitor Tube:

   Monitor tube

4. Core Support Lugs

   Core support blocks, core block buttering, and core block welds (6)

The STP steam generators have been replaced with steam generators fabricated using Alloy 690 material. Aging of steam generator tubes is managed by the Steam Generator Tubing Integrity program (B2.1.8) and is not covered by this program.

Alloy 690 weld overlays were completed for the following pressurizer locations with Alloy 600 welds.

- Unit 2: All six pressurizer location weld overlays completed in Spring 2007.
- Unit 1: All six pressurizer location weld overlays completed in Spring 2008.

These Alloy 600 pressurizer welds are no longer considered to be composed of Alloy 600, since they are completely encased in Alloy 690. Additional augmented inspections are planned for these weld overlays, per MRP-139, for the five year period following completion of each overlay.

The Unit 1 reactor pressure vessel head was replaced during 1RE15, in Fall 2009. The Unit 2 reactor pressure vessel head was replaced during 2RE14, in Spring 2010. All components penetrating the new reactor vessel closure heads, and welded to the inner surfaces of the reactor vessel closure heads, including the head vent piping and elbows, are fabricated with Alloy 690. The penetration nozzles welded to the upper reactor vessel closure heads are subject to the Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors program (B2.1.5).

Other nickel-alloy components (e.g., Alloy 690 or welds made of Alloy 52/152) are not included in this program, but are subject to the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B2.1.1) requirements.

Preventive Actions (Element 2)

The STP Nickel-Alloy AMP has many potential mitigation strategies that remove one or more of the three conditions that control primary water stress corrosion cracking (susceptible material, tensile stress field, supporting environment). Mitigation activities that have been successfully performed for at least one US PWR plant include weld overlays, replacement of Alloy 600 (as a pre-planned activity), and mechanical stress improvement process. Full-structural weld overlays may be used either as a mitigation strategy or as a repair method. This method provides structural reinforcement at the (potentially) flawed location, such that adequate load-carrying capability is provided by the overlay. Components that have full-structural weld overlays comprised of Alloy 690 are considered to be Alloy 690 and are no longer in the STP Nickel-Alloy Aging Management Program. Mechanical stress improvement process is a mechanical process that places the component surface in contact with the primary water in a compressive state, thereby removing the tensile stresses needed for initiation of PWSCC.

The considerations used in the STP Nickel-Alloy Aging Management Program include selecting a mitigation strategy, options for the most cost effective management specific to each category of components, and the optimal course of action. All aspects of the STP Nickel-Alloy Aging Management Program are consistent with the industry guidance provided in MRP-126 and regulatory requirements imposed through ASME Code requirements, and ASME Code Case N-722.

The STP Nickel-Alloy Aging Management Program lists the scheduled preventive action, mitigation or replacement for all STP Alloy 600 components in the STP Alloy 600/82/182 component location and strategy table. The STP Nickel-Alloy Aging Management Program requires this table to be maintained electronically. Specific mitigation strategies will be determined by plant-specific and industry operating experience, and may include (but are not limited to):

Unit 1

Reactor Pressure Vessel Locations

- Upper head temperature reduction completed 1RE09 (May 2000)
- Reactor vessel closure head replacement completed in late 2009
- Mechanical stress improvement process (MSIP), structural weld overlay (inlet and outlet nozzle safe-end welds)

Unit 2

Reactor Pressure Vessel Locations

- Upper head temperature reduction completed 2RE09 (October 2002)
- Reactor vessel closure head replacement completed in early 2010
- MSIP, structural weld overlay (inlet and outlet nozzle safe-end welds)

The Water Chemistry program (B2.1.2) provides preventive actions for monitoring and control of the environment supporting PWSCC.

Parameters Monitored or Inspected (Element 3)

The STP Nickel-Alloy Aging Management Program monitors for cracking due to PWSCC. Loss of material due to boric acid wastage is used as an indication of cracking due to PWSCC. Visual exams are employed to detect evidence of leakage from pressure retaining components within the RCS due to cracking and/or discontinuities and imperfections on the surface of components. Volumetric examinations indicate the presence of cracking/discontinuities throughout the material volume.

The STP ISI program plan provides visual, surface, and volumetric examinations to support the STP Nickel-Alloy Aging Management Program.

Detection of Aging Effects (Element 4)

The STP Nickel-Alloy Aging Management Program utilizes various visual, surface, and volumetric examination techniques for early detection of PWSCC in Alloy 600 components:

1) VT-2 examinations, governed by ASME Section XI, Section IWA-5000, are conducted to detect evidence of leakage from pressure retaining components within the RCS.

2) Bare metal visual examinations, similar to VT-2 examinations, are conducted to detect evidence of leakage from pressure retaining components within the RCS. Unlike VT-2 examinations, removal of insulation is required for bare metal visual (BMV) examinations to allow direct access to the bare metal surface.

3) Surface and volumetric examinations indicate the presence of discontinuities throughout the volume of material. STP uses ultrasonic testing (UT) for volumetric examinations.

The STP ISI program plan provides visual, surface, and volumetric examinations to support the STP Nickel-Alloy Aging Management Program for the components identified in Element 1.

a) Bottom Mounted Instrument Penetrations, Reactor Vessel Inlet and Reactor Vessel Outlet Nozzle:

BMV examinations are implemented consistent with appropriate requirements of Table 1 Item B15.80 in ASME Code Case N-722, subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4). BMV examinations for the reactor vessel inlet and outlet nozzles will be implemented consistent with the requirements of ASME Code Case N-722 Table 1, Item Numbers B15.90 and B15.95, subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4).

b) Core Support Lugs:

VT-3 visual examinations are conducted in accordance with the ISI Program Plan.

Monitoring and Trending (Element 5)

Relative risk rankings for Alloy 600 locations are included as part of the STP Nickel-Alloy Aging Management Program. The risk rankings will be modified as additional information from the industry is collected and analyzed. Those locations that are more susceptible or at higher risk would require more aggressive inspection, mitigation, and repair/replacement plans.

a) Bottom mounted instrument penetrations, reactor vessel inlet, and reactor vessel outlet nozzle

BMV examination frequencies for BMI penetrations are identified by the Nickel-Alloy Aging Management Program for Alloy 600 locations, and are consistent with ASME Code Case N-722. Examinations will be implemented in accordance with appropriate requirements of Table 1 in ASME Code Case N-722, subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4). The following frequencies are identified in ASME Code Case N-722 Table 1, Item B15.90 (outlet nozzle) and Item B15.95 (inlet nozzle).

Outlet nozzle safe-end weld	every refueling outage.
Inlet nozzle safe-end weld	once per interval.

b) Core Support Lugs

VT-3 visual examination frequency is in accordance with the ISI Program Plan.

Acceptance Criteria (Element 6)

Evaluations and acceptance criteria are in accordance with industry standards (e.g., ASME Code) or meet the acceptance of the NRC. For components included in EPRI 1010087 (MRP-139), as listed in the STP Nickel-Alloy Aging Management Program, the program requires that all indications found during inspections must be evaluated per ASME section XI requirements.

a) Bottom Mounted Instrument Penetrations, Reactor Vessel Inlet, and Reactor Vessel Outlet Nozzle

Bottom mounted instrument penetration relevant flaw indications detected as a result of bare metal visual examinations are evaluated in accordance with acceptable flaw evaluation criteria (IWB-3522) provided in ASME Code Case N-722, subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4). Indications that do not satisfy the IWB-3500 acceptance criteria must be dispositioned by an analysis (such as IWB-3600), repaired, or replaced. For bare metal visual examinations of the bottom mounted instrument penetrations, each area or tube location is acceptable if:

1) General Surface Area - no evidence of metal loss from the vessel head outer surface (surface rust is considered acceptable) and

2) Penetration Tube - no evidence of RCS leakage from the penetration tube/vessel head annulus.

For reactor vessel inlet and outlet nozzles, relevant flaw indications detected as a result of bottom mounted instrument examinations will be evaluated in accordance with the flaw evaluation criteria (IWB-3522) provided in ASME Code Case N-722, subject to the conditions listed in 10 CFR 50.55a(g)(6)(ii)(E)(2) through (4).

Corrective Actions (Element 7)

Relevant indications failing to meet applicable acceptance criteria are repaired or evaluated in accordance with plant procedures. Appropriate codes and standards are specified in both the procedures and in design drawings. Quality assurance requirements for repair and replacement activities are also included in the STP Operations Quality Assurance Plan.

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing corrective actions. The QA program includes elements of corrective action, confirmation process and administrative controls, and is applicable to the safety--related and non-safety related systems, structures, and components (SSCs) that are subject to aging management review.

Confirmation Process (Element 8)

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing the confirmation process. The QA program includes elements of corrective action, confirmation process and administrative controls and is applicable to the safety-related and non-safety related systems, structures and components that are subject to aging management review.

Administrative Controls (Element 9)

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing administrative controls. The QA program includes elements of corrective action, confirmation process and administrative controls and is applicable to the safety-related and non-safety related systems, structures and components that are subject to aging management review.

Operating Experience (Element 10)

Operating experience at STP is evaluated and implemented to ensure that the STP Nickel-Alloy Aging Management Program maintains its primary goal of ensuring the integrity of the RCS pressure boundary. This is accomplished by promptly identifying and documenting (using the corrective action program) any conditions or events that suggest Alloy 600 degradation. In addition, industry operating experience, self assessments, and independent audits provide assurance of optimal program performance.

STP has proactively responded to the various NRC and industry publications on nickel-alloy aging issues, including NRC Generic Letter 97-01, NRC Bulletin 2001-01, NRC Bulletin 2002-01, NRC Bulletin 2002-02, NRC Bulletin 2003-2, and NRC Bulletin 2004-01. The inspections in response to the bulletins have demonstrated the effectiveness of the STP Nickel-Alloy Aging Management Program for visually inspecting the reactor vessel top and bottom head to identify any boric acid leakage, and the effectiveness of corrective actions to maintain the intended function of the affected components.

NRC Information Notice 2003-11, Supplement 1, *Leakage Found on Bottom Mounted Instrumentation Nozzles*, explains the PWSCC flaws observed at STP Unit 1 BMI penetrations 1 and 46 (April 2003) were a result of welding flaws produced during initial fabrication. The resulting voids in the J-groove welds established conditions known to promote PWSCC at the weld joint. From these voids, cracks propagated through the tube wall and established a leakage path. BMI penetrations 1 and 46 were repaired prior to restart, using Alloy 690 half-nozzles and 52/152 weld material.

STP has proactively replaced Alloy 600 material with PWSCC resistant Alloy 690 material in many locations. The steam generators, which contained Alloy 600, were all replaced, in both units. The nickel-alloy components of the replacement steam generators were fabricated with Alloy 690 material.

Complete Alloy 690 weld overlays were performed for the following pressurizer locations with Alloy 600 welds.

- Unit 2: All six pressurizer location weld overlays completed in Spring 2007.
- Unit 1: All six pressurizer location weld overlays completed in Spring 2008.

These Alloy 600 Pressurizer welds are no longer considered to be composed of Alloy 600, since they are completely encased in Alloy 690. Additional augmented inspections have been planned for these weld overlays, per MRP-139, for the five year period after completion of each overlay.

The Unit 1 reactor pressure vessel head was replaced during 1RE15, in Fall 2009. The Unit 2 reactor pressure vessel head was replaced during 2RE14, in Spring 2010. All components penetrating the new reactor vessel closure heads, and welded to the inner surfaces of the reactor vessel closure heads, including the head vent piping and elbows, are fabricated with Alloy 690.

Based on a review of 10 years of STP operating experience, the STP Nickel-Alloy Aging Management Program has been effective in ensuring that the reactor coolant system will continue to operate within its licensing basis. These findings, coupled with the aggressive Alloy 600 replacement with PWSCC resistant Alloy 690, provide reasonable assurance that the systems, structures, and components containing nickel-alloy at STP will continue to perform their intended function during the period of extended operation.

Refueling Outage Experience:

Due to NRC Order EA-03-009 Rev 1, during STP refueling outages 1RE14 and 2RE13, STP performed bare metal visual inspections of 100 percent of the reactor pressure vessel head penetrations, including 360 degrees around each of the vessel head penetration nozzles and the head vent penetration. Visual inspection of greater than 95 percent of the reactor pressure vessel head surface was also performed to identify any degradation. No evidence of vessel head penetration nozzle leakage or cracking, or degradation of the reactor pressure vessel head was identified. STP also performed volumetric examination on all reactor head penetration tubes, including the head vent penetration. The examination detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified. STP also performed a visual inspection to identify boric acid leaks from the pressure-retaining components above the reactor pressure vessel head. The results of these inspections are included here:

Unit 1 Inspection Results to NRC Letter NOC-AE-06002094 (12-12-06):

Nondestructive volumetric examination was performed on all 76 reactor head penetration tubes with J-groove welds, including the head vent penetration and the de-gas penetration. The examination detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified. In addition, a visual inspection to identify boric acid leaks from the pressure-retaining components above the reactor pressure vessel head found no indications.

Unit 2 Inspection Results to NRC Letter NOC-AE-07002180 (06-27-07):

A BMV inspection found no relevant indications. No evidence of cracks, leakage, or wastage was found. A non-visual nondestructive volumetric inspection was performed on all

76 reactor head penetration tubes with J-groove welds, including the head vent penetration and the de-gas penetration. The inspection detected no discontinuities or indications of boric acid leak paths, and no flaws needing disposition or corrective action were identified. During an inspection of the pressure-retaining components above the reactor pressure vessel head, a small active leak was identified on an active control rod drive mechanism (penetration number 35). A light film of boric acid residue was observed on the penetration, at the insulation interface. The BMV inspection of the reactor pressure vessel head confirmed that the leak deposited no boric acid residue on the reactor pressure vessel head or into the reactor pressure vessel head penetration annulus.

The STP Alloy 600 materials management Program and operating experience information, as well as STP's proactive approach to PWSCC mitigation (through pressurizer weld overlays, reactor vessel upper head replacements, and replacement of all steam generators), provide objective evidence to support the conclusion that the effects of aging will be adequately managed, so that the intended function of the Alloy 600 components will be maintained during the period of extended operation.

Enhancements

None

Conclusion

The continued implementation of the Nickel-Alloy Aging Management Program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.35 PWR Reactor Internals

Program Description

The PWR Reactor Internals program manages cracking, loss of material, loss of fracture toughness, dimensional changes, and loss of preload for reactor vessel components that provide a core structural support intended function. The program implements the guidance of EPRI 1016596, *PWR Internals Inspection and Evaluation Guideline* (MRP-227, Rev .0) and EPRI 1016609, *Inspection Standard for PWR Internals* (MRP-228, Rev. 0). The program manages aging consistent with the inspection guidance for Westinghouse designated primary components in Table 4-3 of MRP-227 and Westinghouse designated expansion components in Table 4-6 of MRP-227. The expansion components are specified to expand the primary component sample should the indications of the sample be more severe than anticipated. The aging effects of a third set of MRP-227 internals locations are deemed to be adequately managed by existing program components whose aging is managed consistent with ASME Section XI Table IWB-2500-1, Examination Category B-N-3.

Program examination methods include visual examination (VT-3), enhanced visual examination (EVT-1), volumetric examination, and physical measurements. Bolting ultrasonic examination technical justifications in MRP-228 have demonstrated the indication detection capability to detect loss of integrity of PWR internals bolts, pins, and fasteners, such as baffle-former bolting. For some components, the MRP-227 methodology specifies a focused visual (VT-3) examination, similar to the current ASME Code, Section XI, Examination Category B-N-3 examinations, in order to determine the general mechanical and structural condition of the internals by (a) verifying parameters, such as clearances, settings, and physical displacements; and (b) detecting discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion. In some cases, VT-3 visual methods are used for the detection of surface cracking when the component material has been shown to be tolerant of easily detected large flaws. In some cases, where even more stringent examinations are required, enhanced visual (EVT-1) examinations or ultrasonic methods of volumetric inspection, are specified for certain selected components and locations.

The program provides both examination acceptance criteria for conditions detected as a result of monitoring the primary components, as well as criteria for expanding examinations to the expansion components when warranted by the level of degradation detected in the primary components. Based on the identified aging effect, and supplemental examinations if required, the disposition process results in an evaluation and determination of whether to accept the condition until the next examination or implement corrective actions. Any detected conditions that do not satisfy the examination acceptance criteria are required to be dispositioned through the corrective action program, which may require repair, replacement, or analytical evaluation for continued service until the next inspection.

The reactor vessel internals included in the scope of the PWR Reactor Internals program are identified in Element 1. The scope of the program does not include welded attachments to the internal surface of the reactor vessel because these components are managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B2.1.1) (exam category B-N-2) and /or the Nickel-Alloy Aging Management Program (B2.1.34). The scope of the program also does not include BMI flux thimble tubes which are managed by the Flux Thimble Tube Inspection program (B2.1.21).

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants* are provided below.

Scope of Program – Element 1

The scope of the program applies the guidance in MRP-227 which provides augmented inspection and flaw evaluation methodology for assuring the functional integrity of Westinghouse reactor vessel internals. The scope of the PWR Reactor Internals program includes components that provide a core structural support intended function and are managed by the Westinghouse designated primary components in Table 4-3 of MRP-227 and Westinghouse designated expansion components in Table 4-6 of MRP-227 and applicable MRP-227 methodology license renewal applicant action items. MRP-227 also identifies existing program components whose aging is managed consistent with ASME Section XI Table IWB-2500-1, Examination Category B-N-3.

The STP reactor vessel internals are divided into the following major component groups: the lower core support assembly (including the entire core barrel assembly, baffle-former assembly, neutron shield panel, core support plate, and energy absorber assembly), the upper core support (UCS) assembly (including the upper support plate, support column, control rod guide tube assembly, upper core plate, and protective skirt), the incore instrumentation support structures (including the instrumentation columns (exit thermocouples), upper/lower tie plates, and instrumentation columns (BMI)), and miscellaneous alignment/interface components (including internals hold-down spring, upper core plate guide pins, and radial support keys including clevis inserts).

The following reactor vessel internals are included in the scope of the PWR Reactor Internals program:

1. Control rod guide tube assembly

- Guide plate (cards)

- Lower flange welds and adjacent base metal

2. Core barrel assembly

- Upper core barrel flange weld and adjacent base metal

- Core barrel assembly–former bolting
- Core barrel flange
- Core barrel outlet nozzle
- Lower core barrel flange weld and adjacent base metal

3. Baffle–former assembly and bolting

- Baffle-edge bolting
- Baffle–former bolting
- Baffle-former assembly

4. Alignment and interfacing components

- Internals hold-down spring
- Radial support key clevis insert bolts
- Upper core plate guide pins

5. Neutron shield panel (thermal shield assembly)
6. Instrumentation support structures

- Instrumentation columns - BMI

7. Upper core support assembly

- Upper core support protective skirt

The scope of the program also does not include welded attachments to the internal surface of the reactor vessel because these components are managed by the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program (B2.1.1) (exam category B-N-2) and /or the Nickel-Alloy Aging Management Program (B2.1.34). The scope of the program also does not include BMI flux thimble tubes which are managed by the Flux Thimble Tube Inspection program (B2.1.21).

The STP reactor vessel internals configuration does not include the lower internals assembly noted in MRP-227.

Preventive Actions – Element 2

The PWR Reactor Internals program is consistent with the following MRP-227 assumptions (determination of applicability) which are based on PWR representative internals configurations and operational histories.

(1) STP has operated for less than 30 years of operation with high leakage core loading patterns. Operation with high leakage core loading was followed by implementation of a low-leakage fuel management pattern for the remaining operating life.

(2) STP operates at fixed power levels and does not usually vary power based on calendar or load demand schedule.

(3) STP has not implemented any design changes beyond those identified in industry guidance or recommended by Westinghouse.

The PWR Reactor Internals program does not prevent degradation due to aging effects, but provides measures for monitoring to detect the degradation prior to loss of intended function. Preventive measures to mitigate aging effects such as loss of material and cracking include monitoring and maintaining reactor coolant water chemistry consistent with the guidelines of EPRI TR 1014986, *PWR Primary Water Chemistry Guidelines*, Volume 1. The primary water chemistry program is described separately in the Water Chemistry program (B2.1.2).

Parameters Monitored or Inspected – Element 3

The PWR Reactor Internals program monitors the following aging effects by inspection in accordance with the guidance of MRP-227 or ASME Section XI Category B-N-3:

(1). Cracking
Cracking is due to stress corrosion cracking (SCC), primary water stress corrosion cracking (PWSCC), irradiation assisted stress corrosion cracking (IASCC), or fatigue /cyclical loading. Cracking is monitored with a visual inspection for evidence of surface breaking linear discontinuities or a volumetric examination.

(2). Loss of Material
Loss of Material is due to wear. Loss of material is monitored with a visual inspection for gross or abnormal surface conditions.

(3). Loss of Fracture Toughness
Loss of fracture toughness is due to thermal aging, neutron irradiation embrittlement, or void swelling. The impact of loss of fracture toughness is indirectly monitored by using visual or volumetric examination techniques to monitor for cracking and by applying applicable reduced fracture toughness properties in the flaw evaluations if cracking is detected and is extensive enough to warrant a supplemental flaw growth or flaw tolerance evaluation.

(4). Dimensional Changes
Dimensional Changes are due to void swelling and irradiation growth, distortion or deflection.

(5). Loss of Preload
Loss of preload is caused by thermal and irradiation-enhanced stress relaxation or creep. Loss of preload is monitored with a visual inspection for gross surface conditions that may be indicative of loosening in applicable bolted, fastened, keyed, or pinned connections.

The PWR Reactor Internals program manages the aging effects noted above consistent with the inspection guidance for Westinghouse designated primary components in Table 4-3 of MRP-227 and Westinghouse designated expansion components in Table 4-6 of MRP-227. MRP-227 also identifies Existing Program components whose aging is managed consistent with ASME Section XI Table IWB-2500-1, Examination Category B-N-3. See the component list in element 1 to identify Primary, Expansion, and Existing components.

Detection of Aging Effects – Element 4

The PWR Reactor Internals program detects aging effects through the implementation of the parameters monitored or inspected criteria and bases for Westinghouse designated Primary Components in Table 4-3 of MRP-227 and for Westinghouse designated Expansion Components in Table 4-6 of MRP-227. The aging effects of a third set of MRP-227 internals locations identified in Table 4-9 of MRP-227 are deemed to be adequately managed by existing program components whose aging is managed consistent with ASME Section XI Table IWB-2500-1, Examination Category B-N-3.

Monitoring and Trending – Element 5

The program provides both examination acceptance criteria (See Element 6) for conditions detected as a result of monitoring the primary components as described in Element 4, as well as criteria for expanding examinations to the expansion components when warranted by the level of degradation detected in the primary components. Based on the identified aging effect, and supplemental examinations if required, the disposition process results in an evaluation and determination of whether to accept the condition until the next examination or implement corrective actions. Any detected conditions that do not satisfy the examination acceptance criteria (See Element 6) are required to be dispositioned through the corrective action program (See Element 7), which may require repair, replacement, or analytical evaluation for continued service until the next inspection.

Acceptance Criteria – Element 6

Examination acceptance for the Primary and Expansion component examinations are consistent with Section 5 of MRP-227. ASME Section XI section IWB-3500 acceptance criteria apply to Existing Programs components. The following examination acceptance criteria apply to the STP reactor vessel internals:

Visual examination (VT-3) and enhanced visual examination (EVT-1)

For existing program components, the ASME Code Section XI, Examination Category B-N-3 provides the following general relevant conditions for the visual (VT-3) examination of removable core support structures.

(1) Structural distortion or displacement of parts to the extent that component function may be impaired,

(2) Loose, missing, cracked, or fractured parts, bolting, or fasteners,

(3) Corrosion or erosion that reduces the nominal section thickness by more than 5 percent,

(4) Wear of mating surfaces that may lead to loss of function; and

(5) Structural degradation of interior attachments such that the original cross-sectional area is reduced more than 5 percent.

In addition, for the visual examinations (VT-3) of Primary and Expansion components, the PWR Reactor Internals program is consistent with the more specific descriptions of relevant conditions provided in Table 5-3 of MRP-227. EVT-1 examinations are used for detecting small surface breaking cracks and surface crack length sizing when used in conjunction with sizing aids. EVT- 1 examination has been selected to be the appropriate NDE method for detection of cracking in plates or their welded joints. The relevant condition applied for EVT-1 examination is the same as found for cracking in ASME Section XI section 3500 which is crack-like surface breaking indications.

Volumetric examination

Individual bolts are accepted (pass/fail acceptance) based on the detection of relevant indications established as part of the examination technical justification. When a relevant indication is detected in the cross-sectional area of the bolt, it is assumed to be non-functional and the indication is recorded. Bolted assemblies are evaluated for acceptance based on meeting a specified number and distribution of functional bolts. Acceptance criteria for volumetric examination of STP reactor internals bolting are consistent with Table 5-3 of MRP-227.

Physical Measurements

Continued functionality of the internals hold down spring is confirmed by direct physical measurement. The examination acceptance criterion for this measurement is consistent with Table 5-3 of MRP-227 and requires that the remaining compressible height of the spring shall provide hold-down forces within the plant-specific design tolerance.

Corrective Actions – Element 7

The following corrective actions are available for the disposition of detected conditions that exceed the examination acceptance criteria:

(1) Supplemental examinations to further characterize and potentially dispose of a detected condition (Section 5.0 of MRP-227);

(2) Engineering evaluation that demonstrates the acceptability of a detected condition (Section 6.0 of MRP-227);

(3) Repair, in order to restore a component with a detected condition to acceptable status (ASME Section XI); or

(4) Replacement of a component with an unacceptable detected condition (ASME Section XI)

(5) Other alternative corrective action bases if previously approved or endorsed by the NRC.

Relevant indications failing to meet applicable acceptance criteria are repaired or replaced in accordance with plant procedures. Appropriate codes and standards are specified in both the "ASME Section XI Repair, Replacement, and Post-Maintenance Pressure Testing" procedure and in design drawings. Quality assurance requirements for repair and replacement activities are also included in the STP Operations Quality Assurance Plan.

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing corrective actions. The QA program includes elements of corrective action, confirmation process and administrative controls, and is applicable to the safety-related and non-safety related systems, structures, and components that are subject to aging management review.

Confirmation Process – Element 8

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing the confirmation process. The QA program includes elements of corrective action, confirmation process and administrative controls and is applicable to the safety-related and non-safety related systems, structures and components that are subject to aging management review.

Administrative Controls – Element 9

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing administrative controls. The QA program includes elements of corrective action, confirmation process and administrative controls and is applicable to the safety-related and non-safety related systems, structures and components that are subject to aging management review.

Operating Experience — Element 10

Relatively few incidents of PWR internals aging degradation have been reported in operating U.S. commercial PWR plants. However, a considerable amount of PWR internals aging degradation has been observed in European PWRs, with emphasis on cracking of baffle-former bolting. The experience reviewed includes NRC Information Notice 84-18, Stress Corrosion Cracking in PWR Systems and NRC Information Notice 98-11, Cracking of Reactor Vessel Internal Baffle Former Bolts in Foreign Plants. Most of the industry operating experience reviewed has involved cracking of austenitic stainless steel baffle-former bolts, or SCC of high-strength internals bolting. SCC of control rod guide tube split pins has also been reported.

Several other items with existing or suspected material degradation concerns that have been identified for PWR components are wear in thimble tubes and potentially in control guide cards and observed cracking in some high-strength bolting and in control rod guide tube alignment (split) pins. The latter are conditions that have been corrected primarily through bolt replacement with less susceptible material and improved control of pre-load.

The ISI Program portion of the PWR Reactor Internals program at STP is updated to account for industry operating experience. ASME Section XI is also revised every three years and addenda issued in the interim, which allows the code to be updated to reflect operating experience. The requirement to update the ISI Program to reference more recent editions of ASME Section XI at the end of each inspection interval ensures the ISI Program reflects enhancements due to operating experience that have been incorporated into ASME Section XI.

With exception of the ASME Section ISI portions, the PWR Reactor Internals program will be a new program and has no direct programmatic history. A key element of the MRP-227 program is the reporting of aging of reactor vessel components. STP, through its participation in PWR Owners Group and EPRI-MRP activities, will continue to benefit from the reporting of inspection information and will share its own operating experience with the industry through those groups or INPO, as appropriate.

As additional Industry and applicable plant-specific operating experience become available, the OE will be evaluated and appropriately incorporated into the program through the STP Corrective Action and Operating Experience Programs. This ongoing review of OE will continue throughout the period of extended operation, and the results will be maintained on site. This process will confirm the effectiveness of this new license renewal aging management program by incorporating applicable OE and performing self assessments of the program.

Conclusion

The implementation of the PWR Reactor Internals program provides reasonable assurance that aging effects will be adequately managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.36 Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program manages loosening of bolted external connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation to ensure that electrical cable connections not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49 and within the scope of license renewal are capable of performing their intended function.

As part of the STP predictive maintenance program, infrared thermography testing is being performed on non-EQ electrical cable connections associated with active and passive components within the scope of license renewal. A representative sample of external connections will be tested once prior to the period of extended operation using infrared thermography to confirm that there are no aging effects requiring management. The infrared thermography test will detect loosening of bolted connections or high resistance of cable connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

The selected sample to be tested is based upon application (medium and low voltage), circuit loading (high or low load), and environment (temperature, high humidity, vibration, etc.). The technical basis for the sample selection is documented.

The acceptance criteria for thermography testing will be based on the temperature rise above the reference temperature. The reference temperature will be ambient temperatures or the baseline temperature data from the same type of connections being tested. The one time testing of a sample of non-EQ electrical cable connectors is representative, with reasonable assurance, that non-EQ electrical cable connections within similar application, circuit loading conditions, and environments is bounded by the testing.

Corrective actions for conditions that are adverse to quality will be performed in accordance with the corrective action program as part of the QA program. The corrective action process provides reasonable assurance that deficiencies adverse to quality are either promptly corrected or are evaluated to be acceptable.

NUREG-1801 Consistency

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that, when implemented, will be consistent with License Renewal Interim Staff Guidance LR-ISG-2007-02 and NUREG-1801, Section XI.E6, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Operating experience has shown that loosening of connections and corrosion of connections are aging mechanisms that, if left unmanaged, could lead to a loss of electrical continuity and potential arcing or fire.

STP routinely performs infrared thermography on electrical components and connections. A review of the plant operating experience identified a small number of scans where electrical cable connections showed thermal anomaly. No loss of equipment intended function has occurred due to these thermal anomalies.

The Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program; therefore, plant-specific operating experience to verify the effectiveness of the program is not available. Industry operating experience that forms the basis for these programs is included in the operating experience element of the corresponding NUREG-1801, aging management program description. Plant-specific operating experience was reviewed to ensure that the operating experience discussed in the corresponding NUREG-1801, program is bounding, (i.e., that there is no unique, plant-specific operating experience in addition to that in NUREG-1801).

As additional industry and plant-specific applicable operating experience becomes available, it will be evaluated and incorporated into the program through the STP condition reporting and operating experience programs.

Conclusion

The implementation of Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will provide reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B2.1.37 Selective Leaching of Aluminum Bronze

Program Description

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching for aluminum bronze (copper alloy with greater than eight percent aluminum) components exposed to treated and raw water within the scope of license renewal. This plant-specific program will use requirements of the Selective Leaching of Materials program (B2.1.17) specifically relating to aluminum bronze components. The selective leaching of aluminum bronze is applied in addition to the Open-Cycle Cooling Water program (B2.1.9).

The Selective Leaching of Aluminum Bronze program is an existing program that is implemented by plant procedure. This procedure directs that every six months (not to exceed nine months), an inspection of aluminum bronze (copper alloy with greater than eight percent aluminum) components be completed. In addition, there is a significant amount of buried aluminum bronze piping. The piping itself has less than eight percent aluminum content, and is not susceptible to de-alloying. However, there are welds in which the filler metal is copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above aluminum bronze buried piping from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that would indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program. Components with indications of through-wall de-alloying, greater than one inch, will be replaced by the end of the next refueling outage.

Aging Management Program Elements

The results of an evaluation of each element against the 10 elements described in Appendix A of NUREG-1800, *Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants* are provided below.

Scope of Program (Element 1)

The Selective Leaching of Aluminum Bronze program manages loss of material due to selective leaching for aluminum bronze (copper alloy with greater than eight percent aluminum) pumps, piping and valve bodies exposed to raw water within the scope of license renewal. These aluminum bronze (copper alloy with greater than eight percent aluminum) components with raw water internal environments are susceptible to loss of material due to selective leaching (de-alloying).

STP has analyzed the effects of de--alloying and found that the degradation is slow so that rapid or catastrophic failure is not a consideration. STP has determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended functions of the essential cooling water and essential cooling water screen wash system. The prudent course of action is to continue monitoring and replace components when needed.

This procedure directs that every six months (not to exceed nine months), an inspection of all susceptible aluminum bronze (copper alloy with greater than eight percent aluminum) components be completed and any components that show evidence of de-alloying will be replaced by the end of the next refueling outage. In addition, there is a significant amount of buried aluminum bronze piping. The piping has an aluminum content of less than eight percent and is not susceptible to de-alloying. However, there are welds in which the filler metal is copper alloy with greater than eight percent aluminum material. Therefore, the procedure directs that a yard walkdown be performed above aluminum bronze buried piping from the intake structure to the unit and from the unit to the discharge structure to look for changes in ground conditions that would indicate leakage. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall de-alloying are evaluated, and scheduled for replacement by the corrective action program.

Components, greater than one inch, will be replaced by the end of the next refueling outage..

Preventive Actions (Element 2)

The Selective Leaching of Aluminum Bronze program does not prevent degradation due to aging effects but provides for inspections to detect aging degradation prior to the loss of intended functions.

The Open-Cycle Cooling Water program (B2.1.9) uses an oxidizing biocide treatment (sodium hypochlorite and sodium bromide) to reduce the potential for microbiologically influenced corrosion.

Parameters Monitored or Inspected (Element 3)

The Selective Leaching of Aluminum Bronze program includes visual inspections every six months (not to exceed nine months) for dealloying in all susceptible aluminum bronze (copper alloy with greater than eight percent aluminum) components. During these inspections, if evidence of through-wall de-alloying is discovered, the components are evaluated and scheduled for replacement by the corrective action program. Components, greater than one inch, will be replaced by the end of the next refueling outage.

Detection of Aging Effects (Element 4)

The Selective Leaching of Aluminum Bronze program includes visual inspection of aluminum bronze (copper alloy with greater than eight percent aluminum) components to determine if selective leaching of these components is occurring. Aluminum bronze (copper alloy with greater than 8 percent aluminum) components which are found to have indications of through-wall dealloying are evaluated, and scheduled for replacement by the corrective action program. Components, greater than one inch, will be replaced by the end of the next refueling outage.

Monitoring and Trending (Element 5)

There is no monitoring and trending for the visual inspections of aluminum bronze components.

Acceptance Criteria (Element 6)

De-alloying of aluminum bronze components is a well known phenomenon at STP. A long term improvement plan was developed in May 1992. As a result of these analyses, aluminum bronze (copper alloys with greater than eight percent aluminum) components are visually inspected every six months (not to exceed nine months). Upon discovery of visual evidence of through-wall de-alloying, components are evaluated, and scheduled for replacement by the corrective action program. Components, greater than one inch, will be replaced by the end of the next refueling outage. Due to the slow nature of de-alloying, this replacement interval provides reasonable assurance that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

Corrective Actions (Element 7)

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing corrective actions. The QA program includes elements of corrective action, and is applicable to the safety-related and nonsafety-related systems, structures and components that are subject to aging management review.

Confirmation Process (Element 8)

STP site QA procedures, review and approval process, and administrative controls are implemented in accordance with the requirements of 10 CFR 50 Appendix B and are acceptable in addressing confirmation processes and administrative controls. The QA program includes elements of corrective action, and is applicable to the safety-related and nonsafety-related systems, structures and components that are subject to aging management review.

Administrative Controls (Element 9)

See Element 8.

Operating Experience (Element 10)

A review of the STP plant-specific operating experience indicates that macrofouling, general corrosion, erosion-corrosion, and through-wall de-alloying have been observed in aluminum bronze components. STP has analyzed the effects of the through-wall de-alloying and found that the degradation is slow so that rapid or catastrophic failure is not a consideration, and determined that the leakage can be detected before the flaw reaches a limiting size that would affect the intended functions of the essential cooling water and essential cooling water screen wash system. A long range improvement plan and engineering evaluation were developed to deal with the de-alloying of aluminum bronze components. Based on these analyses, the approach has been to evaluate components, and schedule replacement by the corrective action program. Components, greater than one inch will be replaced by the end of the next refueling outage. A monitoring and inspection program provides confidence in the ability to detect the leakage.

Enhancements

None

Conclusion

The continued implementation of the Selective Leaching of Aluminum Bronze program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B3 TLAA SUPPORT ACTIVITIES

B3.1 METAL FATIGUE OF REACTOR COOLANT PRESSURE BOUNDARY

Program Description

The Metal Fatigue of Reactor Coolant Pressure Boundary program manages fatigue cracking caused by anticipated cyclic strains in metal components of the RCPB. The program ensures that actual plant experience remains bounded by the transients assumed in the design calculations, or that appropriate corrective actions maintain the design and licensing basis by other acceptable means.

The Metal Fatigue of Reactor Coolant Pressure Boundary program consists of cycle counting activities. The program will be enhanced to monitor and trend fatigue usage at selected locations in the reactor coolant pressure boundary. The program will be enhanced to include additional transients and locations identified by the evaluation of ASME Section III fatigue analyses, locations necessary to ensure accurate calculations of fatigue, and the NUREG/CR-6260 locations for a newer-vintage Westinghouse Plant. The supporting environmental life correction factor calculations were performed with NUREG/CR-6583 for carbon and low alloy steels and with NUREG/CR-5704 for austenitic stainless steels.

The Metal Fatigue of Reactor Coolant Pressure Boundary program tracks the occurrences of selected transients and will be enhanced to monitor the cumulative usage factors (CUFs) at selected locations using one of the following methods:

1) The Cycle Counting (CC) method does not periodically calculate CUF; however, transient event cycles affecting the location (e.g. plant heatup and plant cooldown) are counted to ensure that the numbers of transient events assumed by the design calculations are not exceeded.

2) The Cycle Based Fatigue (CBF) management method utilizes the CC results and stress intensity ranges generated with the ASME III methods that use six stress-tensors to perform periodic CUF calculations for a selected location. The fatigue accumulation is tracked to determine approach to the ASME allowable fatigue limit of 1.0.

The Metal Fatigue of Reactor Coolant Pressure Boundary program continuously monitors plant data, and maintains a record of the data collected. The collected data are analyzed to identify operational transients and events, calculate usage factors for selected monitored locations, and compare the calculated usage factors to allowable limits. Periodic review of the calculations ensures that usage factors will not exceed the allowable value of 1.0 without an appropriate evaluation and any further necessary actions. If a cycle count or CUF value increases to a program action limit, corrective actions will be initiated to evaluate the design limits and determine appropriate specific corrective actions. Action limits permit completion of corrective actions before an assumed number of events in a fatigue analysis is exceeded.

NUREG-1801 Consistency

The Metal Fatigue of Reactor Coolant Pressure Boundary program is an existing program that, following enhancement, will be consistent with NUREG-1801, Section X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary.

Exceptions to NUREG-1801

None

Enhancements

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

Scope of Program (Element 1) and Monitoring and Trending (Element 5)

Procedures will be enhanced to include locations identified by the evaluation of ASME Section III fatigue analyses, locations necessary to ensure accurate calculations of fatigue, and the NUREG/CR-6260 locations for a newer-vintage Westinghouse Plant.

Scope of the Program (Element 1), and Parameters Monitored or Inspected (Element 3)

Procedures will be enhanced to include additional transients that contribute significantly to fatigue usage identified by the evaluation of ASME Section III fatigue analyses.

Detection of Aging Effects (Element 4)

The procedures will be enhanced to 1) include additional transients necessary to ensure accurate calculations of fatigue, 2) fatigue usage monitoring at specified locations, and 3) specify the frequency and process of periodic reviews of the results of the monitored cycle count and CUF data at least once per fuel cycle. This review will compare the results against the corrective action limits to determine any approach to action limits and any necessary revisions to the fatigue analyses will be included in the corrective actions.

Preventive Actions (Element 2) and Acceptance Criteria (Element 6)

The procedures will be enhanced to include additional cycle count and fatigue usage action limits, which will invoke appropriate corrective actions if a component approaches a cycle count action limit or a fatigue usage action limit. Action limits permit completion of corrective actions before the design limits are exceeded. The acceptance criteria associated with the NUREG/CR-6260 sample locations for a newer vintage Westinghouse plant will account for environmental effects on fatigue.

Cycle Count Action Limits:

Cycle count action limits are selected to initiate corrective action when the cycle count for any of the critical thermal or pressure transients is projected to reach the design limit within the next three fuel cycles.

CUF Action Limits:

CUF action limits require corrective action when the calculated CUF for any monitored location is projected to reach 1.0 within the next three fuel cycles.

Corrective Actions (Element 7)

Procedures will be enhanced to include appropriate corrective actions to be invoked if a component approaches a cycle count or CUF action limit.

If a cycle count action limit is reached, acceptable corrective actions include:

1) Review of fatigue usage calculations:

a) To identify the components and analyses affected by the transient in question.

b) To determine whether the transient in question contributes significantly to CUF.

c) To ensure that the analytical bases of the leak-before-break (LBB) fatigue crack propagation analysis and of the high energy line break (HELB) locations are maintained.

d) To ensure that the analytical bases of a fatigue crack growth and stability analysis in support of relief from ASME Section XI flaw removal.

2) Evaluation of remaining margins on CUF.

3) Redefinition of the specified number of cycles (e.g., by reducing specified numbers of cycles for other transients and using the margin to increase the allowed number of cycles for the transient that is approaching its specified number of cycles).

4) Redefinition of the transient to remove conservatism in the pressure and temperature ranges.

Since the counting action limits are based on a somewhat-arbitrary cycle count that does not accurately indicate approach to the CUF = 1.0 fatigue limit, these preliminary actions are designed to determine how close the approach is to the 1.0 limit, and from those determinations, set new action limits. If the CUF has approached 1.0 then further actions described below for cumulative fatigue usage action limits may be invoked.

If a CUF action limit is reached acceptable corrective actions include:

1) Determine whether the scope of the management program must be enlarged to include additional affected reactor coolant pressure boundary locations. This determination will ensure that other locations do not approach design limits without an appropriate action.

2) Enhance fatigue managing to confirm continued conformance to the code limit.

3) Repair the component.

4) Replace the component. If a limiting component is replaced, assess the effect on locations monitored by the program. If a limiting component is replaced, resetting its cumulative fatigue usage factor to zero, a component which was previously bounded by the replaced component will become the limiting component and may need to be monitored.

5) Perform a more rigorous analysis of the component to demonstrate that the design code limit will not be exceeded.

6) Modify plant operating practices to reduce the fatigue usage accumulation rate.

7) Perform a flaw tolerance evaluation and impose component specific inspections, under ASME Section XI Appendices A or C (or their successors), and obtain required approvals by the NRC.

Operating Experience

The STP industry operating experience program reviews industry experience, including experience that may affect fatigue management, to ensure that applicable experience is evaluated and incorporated in plant analyses and procedures. Any necessary evaluations are conducted under the plant corrective action program.

The Metal Fatigue of Reactor Coolant Pressure Boundary program was implemented in response to industry experience that indicated that the design basis set of transients used for fatigue analyses of the reactor coolant pressure boundary did not include some significant transients, and therefore might not be limiting for components affected by them. Examples:

Thermal stratification of pressurizer surge line piping:

In response to NRC Bulletin 88-11, Westinghouse performed a plant-specific evaluation of STP pressurizer surge lines. The surge line stratification analysis was based on STP design transients. It was concluded that thermal stratification does not affect the integrity of the pressurizer surge lines. STP responses to NRC Bulletin 88-11 describe the inspections, analyses, and procedural revisions made to ensure that thermal stratification does not affect the integrity of the pressurizer surge lines. In addition, the responses noted that fatigue analyses were updated to ensure compliance with applicable codes and license commitments.

Thermal fatigue cracking in normally-isolated piping:

In 1988, as identified in NRC Bulletin 88-08, there were several instances of thermal fatigue cracking in normally stagnant lines attached to reactor coolant system (RCS) piping. This issue was addressed by utilities by conducting evaluations and monitoring to ensure that further leakage would not occur. STP performed a complete analysis of systems connected to the RCS. The review concluded that the potential for the described thermal conditions existed only in the normal charging, alternate charging, and auxiliary spray lines. However, these systems are separated and only hot water can leak through the charging and auxiliary spray lines, reducing the potential for thermal cycling.

Conclusion

The continued implementation of the Metal Fatigue of Reactor Coolant Pressure Boundary program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B3.2 ENVIRONMENTAL QUALIFICATION (EQ) OF ELECTRICAL COMPONENTS

Program Description

The Environmental Qualification (EQ) of Electrical Components program manages component thermal, radiation, and cyclical aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, environmental qualification components not qualified for the current license term are to be refurbished or replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for environmental qualification components that specify a qualification of at least 40 years are considered time-limited aging analyses (TLAAs) for license renewal.

STP is a NUREG-0588 Category I plant. Electrical equipment within the scope of the STP Environmental Qualification (EQ) of Electrical Components program is environmentally qualified in accordance with NUREG-0588, Category I requirements as supplemented by 10 CFR 50.49. However, the NRC evaluated STP electrical equipment qualification based on Regulatory Guide 1.89 Revision 0, because Revision 1 was not yet issued. 10 CFR 50.49 and Regulatory Guide 1.89 Revision 0 and Revision 1 all invoke IEEE Standard 323-1974, which provides the criteria for safety-related equipment ("Class 1E" equipment). IEEE Standard 323-1974 also provides the basis for categorizing components important to safety, and defines environmental service conditions. The STP Environmental Qualification (EQ) of Electrical Components program therefore includes and identifies electrical components that are important to safety and that could be exposed to harsh environment accident conditions, consistent with 10 CFR 50.49, with the following exemption:

STP has been granted an exemption from the environmental qualification scope for certain low safety/risk significant (LSS) and non-risk significant (NRS) environmental qualification components. These components remain within the scope of equipment qualification. The STP integrated SSC categorization process uses both a probabilistic- and a deterministic-based methodology that appropriately addresses the issues of defense—in-depth, safety margins, and aggregate risk.

The Environmental Qualification (EQ) of Electrical Components program is documented in procedures. Qualified components and their service requirements and environments are identified in the Equipment Qualification Database.

Analytical Methods: The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied. The Arrhenius methodology is an acceptable model for a thermal aging evaluation. For license renewal radiation aging evaluation, 60-year normal radiation dose is established by extrapolating the 40-year normal dose (40 year dose times 1.5) plus accident radiation dose. 60-year cyclical aging is established in a similar manner. Other models may be justified on a case-by-case basis.

Data Collection and Reduction Methods: Reducing excess conservatism in the component service conditions (for example, temperature, radiation, and cycles) used in the prior aging evaluation is the chief method used for a reanalysis. Actual monitored service conditions such as temperature are generally lower than the design service conditions used in the prior aging evaluation and therefore can support extended thermal life of the equipment.

Underlying Assumptions: Environmental qualification component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected environmental qualification component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

Excess conservatism in thermal life analysis may be reduced by reevaluating material activation energy, to justify a higher value that would support extended life at elevated temperature. Similar methods of reducing excess conservatism in the component service conditions and material properties used in prior aging evaluations may be used for radiation and cyclical aging. Any changes to material activation energy will be justified.

Acceptance Criteria and Corrective Actions: If qualification cannot be extended by reanalysis, the component is refurbished or replaced prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace or re-qualify the component if reanalysis is unsuccessful).

NUREG-1801 Consistency

The Environmental Qualification (EQ) of Electrical Components program is an existing program that is consistent with NUREG-1801, Section X.E1, Environmental Qualification (EQ) of Electrical Components.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Environmental Qualification (EQ) of Electrical Components program complies with 10 CFR 50.49, and includes consideration of operating experience for determining qualification bases and conclusions, including qualified life.

On a continuing basis, the Environmental Qualification (EQ) of Electrical Components program has ensured that the design and installation of harsh environment equipment meets site-specific environmental qualification requirements. These environmental qualification requirements, in turn, provide reasonable assurance that the equipment will operate properly for the period relied upon to prevent the occurrence of, or mitigate the effects of, an accident or plant transient.

Operating Experience defines the process for review, evaluation and subsequent actions for NRC and industry operating experience, system, equipment or component related information. STP has a comprehensive Operating Experience Program that monitors industry issues and assesses these for applicability to its own operation. The STP Corrective Action Program is used to track, trend, and evaluate plant issues. The Environmental Qualification Program ensures that the design and installation of harsh environment equipment meets site-specific environmental qualification requirements. These requirements provide reasonable assurance that the equipment will operate properly, for the period relied upon, to prevent the occurrence of, or mitigate the effects of, an accident or plant transient.

When an emerging industry aging issue is identified that affects the qualification of an EQ component, the affected component is evaluated and appropriate corrective actions are taken as necessary. Changes to the equipment qualification evaluations are documented in the affected Environmental Qualification Checklist Packages (EQCPs).

The following condition report samples indicate that the Environmental Qualification Program is routinely monitored and evaluated:

- Update environmental qualification documentation for the new Core Exit Thermocouple connector assemblies.
- Evaluate main steam line break scenario impact on the environmental qualification equipment in the isolation valve cubicle.
- Remove main steam bypass solenoid valves from the Environmental Qualification Program.
- Extend the qualified life of the reactor vessel water level system connectors.
- Enhance equipment qualification procedure to more fully define owners and responsibilities of maintenance of the environmental qualification database.
- Address deletion or abandonment of equipment in the design change process procedure to ensure necessary environmental qualification reviews are performed.

- Evaluate environmental qualification training effectiveness.
- Develop and perform a sampling assessment of environmental qualification components in harsh environments to determine if qualifications match environment.

Based on this review of STP operating experience, there is confidence that the STP Environmental Qualification (EQ) of Electrical Components program is being managed effectively. Self-assessments of the Environmental Qualification Program have and will continue to be performed to identify areas that need improvement. The Environmental Qualification (EQ) of Electrical Components program operating experience information provides objective evidence to support the conclusion that the effects of aging will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Environmental Qualification (EQ) of Electrical Components program provides reasonable assurance that aging will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B3.3 CONCRETE CONTAINMENT TENDON PRESTRESS

Program Description

The Concrete Containment Tendon Prestress program, within the STP ASME Section XI Subsection IWL program, manages the loss of tendon prestress aging effect in the post-tensioning system, and is consistent with requirements of 10 CFR 50.55a (including the 10 CFR 50.55a supplemental requirements). The program ensures that the average tendon prestress in each of the vertical and horizontal tendon groups will be maintained above its design basis minimum required value (MRV) for the period of extended operation.

The STP containments are prestressed concrete, hemispherical dome-on-a-cylinder structures with a steel membrane liner and a flat basemat. Post-tensioned tendons compress the concrete and permit the structures to withstand design basis accident internal pressures.

In accordance with 10 CFR 50.55a(g)(4)(ii), the third interval inservice inspection program for Subsection IWL will be conducted in accordance with the requirements of the 2004 Edition no addenda of ASME Section XI.

The design acceptance criterion is that the measured losses must come close enough to predicted values to provide high confidence that the design value for minimum prestress force will be exceeded throughout the life of the plant. The design acceptance criterion is ensured by surveillance program acceptance criteria that are consistent with ASME XI Subsection IWL-3221.1.

The program specifies sample size, randomly selects tendons for testing, and if the relaxation is not acceptable, prescribes retensioning or other corrective measures to ensure that at no time will the average prestress in a tendon group fall below their minimum required prestress. In accordance with Regulatory Guide 1.35, Inspection of Ungrouted Tendons in Prestressed Concrete Containments, April 1979, proposed Revision 3, the examination frequency for Unit 1 is 1, 5, and 10 years after its initial Structural Integrity Test and every 10 years thereafter; and the examination frequency for Unit 2 is 1, 5, and 15 years after its initial Structural Integrity Test and every 10 years thereafter. Beginning year 15, the tendon surveillance program complies with ASME XI Subsection IWL. The concrete visual examination is performed at 5-year intervals for each unit. The initial SIT for Unit 1 was completed in March 1987. The initial SIT for Unit 2 was completed in September 1988.

The program inspects a random sample of tendons from each group (vertical and horizontal) in each inspection interval to confirm that acceptance criteria, calculated from surveillance program predicted prestress force lines, are met, and therefore that tendon prestresses will remain above MRVs for the succeeding inspection interval. At each inspection the program also recalculates the regression analysis trend lines of these two groups, based on individual tendon forces, to confirm whether average prestresses will remain above their MRVs for the remainder of the licensed operating period.

The program performs a separate regression analysis of each of the horizontal and vertical tendon groups of each unit.

The most recent regression analysis is included in the 2009, 20-year tendon surveillance report. It found (1) the recent surveillance data for individual tendons have all fallen above the first action limit at 95 percent of the predicted force line; and (2) the regression analysis of surveillance lift-off data has extended the trend lines for both the vertical and horizontal tendons of each unit to 100 years. A comparison of these regression curves with their respective MRVs and predicted prestress force lines confirms that the average prestress forces will remain above their MRVs and meet the requirements of 10 CFR 50.55a(b)(2)(viii)(B).

The current surveillance program will continue through the period of extend operation. The tendon surveillance program provides opportunity for evaluation should the trend lines fall below 95 percent of the predicted force and requires corrective action should the trends fall below the MRV prior to the next scheduled surveillance. The current regression analysis of the STP vertical and horizontal tendons extends the predicted loss of prestress through the period of extended operation, and demonstrates that loss of prestress will remain within acceptable values for the period of extended operation.

NUREG-1801 Consistency

The Concrete Containment Tendon Prestress program is an existing program that is consistent with NUREG-1801, Section X.S1, Concrete Containment Tendon Prestress.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

Tendon surveillance and lift-off tests for the Concrete Containment Tendon Prestress program employ examination procedures which invoke and are developed from the design criteria (minimum required values), inspection acceptance criteria (predicted prestress force lines; and their application to action levels and corrective actions), inspection schedule sample selection, and effective stress calculation methods.

The STP tendon inspections to date have shown no evidence of significant corrosion or other effects that might damage wires, minimum wire breakage (after initial installation), and no accelerated loss of prestress due to high temperatures or other causes.

Grease voids in excess of surveillance requirements were found during the Unit 1 year 3, 5, and 10 inspections; and Unit 2 year 3, 5, and 15 inspections. Surveillance requirements were 5 percent duct volume under Regulatory Guide 1.35, and 10 percent under ASME Section XI Subsection IWL. In all of these identified cases, neither grease leakage, nor any evidence of abnormal degradation was found.

To date, 140 lift-off tests have been conducted. All but two of these were acceptable (greater than 95 percent of predicted force). The other two occurred in year 1 (Unit 2) and year 5 (Unit 1), both at 94 percent of predicted force. In years 10, 15, and 20 all tested tendons were found to be above the acceptance limit. Thus, nothing has been observed that is indicative of unanticipated rates of degradation.

Anticipated Prestress Losses:

The anticipated losses during the period of extended operation are small. If the existing trend lines are extended to 100 years, the worst case group (Unit 1 horizontals) will be very close to, but slightly above, the 95 percent of predicted force threshold. Nevertheless these tendons are trending toward values that remain well above the minimum required design prestresses forces for the period of extended operation.

The Concrete Containment Tendon Prestress program operating experience information provides evidence to support that the program is consistent with current standards, practices, and experience of the industry. And therefore, the containment tendons will be managed adequately so that the intended functions will be maintained during the period of extended operation.

Conclusion

The continued implementation of the Concrete Containment Tendon Prestress program provides reasonable assurance that aging effects will be managed such that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

APPENDIX C

(NOT USED)

APPENDIX D

TECHNICAL SPECIFICATION CHANGES

(Not Used)