Vogtle Electric Generating Plant
Units 1 and 2
License Renewal Application

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LICENSE RENEWAL APPLICATION

VOGTLE ELECTRIC GENERATING PLANT
UNITS 1 AND 2

Docket Nos. 50-424 and 50-425
Facility Operating License Nos. NPF-68 and NPF-81

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SECTION 1 ADMINISTRATIVE INFORMATION

1.0 INTRODUCTION

This License Renewal Application for Vogtle Electric Generating Plant is intended to provide sufficient information for the Nuclear Regulatory Commission (NRC) to complete its technical and environmental reviews. Pursuant to 10 CFR Parts 54 and 51, respectively, the License Renewal Application is designed to allow the NRC to make the findings required by 10 CFR 54.29 in support of the issuance of a renewed facility operating license.

1.1 GENERAL INFORMATION – 10 CFR 54.19

1.1.1 NAMES OF THE APPLICANT AND CO-OWNERS

Southern Nuclear Operating Company, Inc. (SNC) hereby applies for renewed operating licenses for Vogtle Electric Generating Plant (VEGP), Units 1 and 2. SNC submits this application individually and as agent for the plant co-owners and co-licensees, Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and the City of Dalton, Georgia.

1.1.2 ADDRESSES OF THE APPLICANT AND CO-OWNERS

Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P.O. Box 1295
Birmingham, Alabama 35201-1295

Georgia Power Company
241 Ralph McGill Boulevard
Atlanta, Georgia 30308

Oglethorpe Power Corporation
2100 East Exchange Place
P.O. Box 1349
Tucker, Georgia 30084

Municipal Electric Authority of Georgia
1470 Riveredge Parkway, NW
Atlanta, Georgia 30328-4686

The City of Dalton
Dalton Utilities
1200 V. D. Parrott, Jr. Parkway
Dalton, Georgia 30722

1.1.3 DESCRIPTIONS OF THE BUSINESS OR OCCUPATION OF THE APPLICANT AND CO-OWNERS

Southern Nuclear Operating Company, Inc.

SNC is engaged in the operation of nuclear power plants. SNC operates the Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2, and the Vogtle Electric Generating Plant (VEGP) Units 1 and 2, for Georgia Power Company (GPC), Oglethorpe Power Corporation (OPC), the Municipal Electric Authority of Georgia (MEAG), and the City of Dalton, Georgia (the co-owners); and the Joseph M. Farley Nuclear Plant (FNP) for Alabama Power Company. The combined electric generation of the three plants is in excess of 5,900 MW.

SNC is the exclusive licensed operator of VEGP Units 1 and 2.

Georgia Power Company

Georgia Power Company (GPC) is engaged in the generation and transmission of electricity and the distribution and sale of such electricity within the State of Georgia. Georgia Power Company serves more than two million customers in a service area of approximately 57,000 square miles constituting 97 percent of the State of Georgia's land area. With a rated capability of approximately 16,000 MW, GPC currently provides retail electric service in all but 4 of Georgia's 159 counties.

Oglethorpe Power Corporation

Oglethorpe Power Corporation (an Electric Membership Corporation) supplies electricity at wholesale to 39 Electric Membership Corporations in the State of Georgia, which in turn distribute this electricity at retail to their residential, commercial and industrial customers.

Municipal Electric Authority of Georgia

MEAG is an electric generation and transmission public corporation, which provides wholesale power to 49 communities in the State of Georgia and other wholesale customers. These communities, in turn, supply electricity to more than 600,000 retail consumers, representing approximately 7 percent of Georgia’s population, in their respective service areas across the state.

City of Dalton

The City of Dalton is a municipality within the State of Georgia. Acting by and through the Board of Commissioners of its Water, Light and Sinking Fund, doing business as Dalton Utilities, Dalton owns electric generation capacity, transmission capacity and a distribution system. Dalton is a duly incorporated municipality under the laws of the State of Georgia.

1.1.4 DESCRIPTIONS OF THE ORGANIZATION AND MANAGEMENT OF THE APPLICANT AND CO-OWNERS

Southern Nuclear Operating Company, Inc.

SNC is a wholly-owned subsidiary of The Southern Company (Southern Company), a Delaware corporation registered under the Public Utility Holding Company Act of 1935, having its principal place of business in Atlanta, Georgia. Traditional operating companies that are subsidiaries of Southern Company are Georgia Power Company, Alabama Power Company, Gulf Power Company, and Mississippi Power Company. Other subsidiaries of the Southern Company system are Southern Company Services, Inc. a wholly-owned system service organization; Southern Linc, a wholly-owned company providing wireless communications to the Southern Company system and to other businesses in Southern Company's service area; Southern Power, a wholly-owned wholesale energy provider; and Southern Telecom, Inc, a wholly-owned company providing fiber optic communications to the Southern Company system and to other businesses in Southern Company's service area.

The traditional service area of Southern Company includes Alabama, Georgia, and significant areas of Mississippi and Florida. Southern Company power plants have a total installed generating capacity of more than 41,000 MW as of January 1, 2007

Neither SNC nor its parent, Southern Company, is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. SNC files this application on its own behalf and as agent of the co-owners.

The names and business addresses of SNC's directors and principal officers, all of whom are citizens of the United States, are as follows:

Directors

D. M. Ratcliffe President and Chief Executive Officer Southern Company	30 Ivan Allen Jr. Blvd. NW Atlanta, Georgia 30308
M. D. Garrett President & Chief Executive Officer Georgia Power Company	241 Ralph McGill Boulevard Atlanta, Georgia 30308
C. D. McCrary President and Chief Executive Officer Alabama Power Company	600 North 18th Street Birmingham, Alabama 35203

Principal Officers

J. B. Beasley, Jr., President and CEO, Birmingham, Alabama

J. T. Gasser, Executive Vice President, Birmingham, Alabama

J. A. (Buzz) Miller, Sr. Vice President, Nuclear Development, Birmingham, Alabama

J. R. Johnson, Vice President, Farley Project, Dothan, Alabama

D. R. Madison, Vice President, Hatch Project, Baxley, Georgia

T. E. Tynan, Vice President, Vogtle Project, Waynesboro, Georgia

L. M. Stinson, Vice President, Fleet Operations Support, Birmingham, Alabama

M. M. Caston, Vice President and General Counsel, Birmingham, Alabama

K. S. King, CFO and Vice President, Corporate Services, Birmingham, Alabama

D. H. Jones, Vice President, Engineering, Birmingham, Alabama

S. A. Mitchell, Corporate Secretary, Birmingham, Alabama

The names and business addresses of Georgia Power Company's directors and principal officers, all of whom are citizens of the United States, are as follows:

Directors

Gus H. Bell III	329 Commercial Dr., Suite 200 Savannah, Georgia 31406
Robert L. Brown, Jr.	250 E. Ponce De Leon Ave. 8th Floor Decatur, Georgia 30030
Ronald D. Brown	100 Auburn Avenue Northeast Atlanta, Georgia 30303
Anna R. Cablik	2272 Mabros Industrial Parkway Ellenwood, Georgia 30294
Michael D. Garrett	241 Ralph McGill Boulevard Atlanta, Georgia 30308
David M. Ratcliffe	30 Ivan Allen Jr. Blvd. NW Atlanta, Georgia 30308
Jimmy C. Tallent	63 Highway 515 Blairsville, Georgia 30512
D. Gary Thompson	*(Retired from Wachovia Corporation)*
Richard W. Ussery	*(Retired from Total System Services Corporation)*
William Jerry Vereen	301 Riverside Dr Moultrie, Georgia , 31768-8603
E. Jenner Wood, III	P.O. Box 4418, MC0103 Atlanta, Georgia 30302-4418

Principal Officers

Michael D. Garrett, President and CEO, Atlanta, Georgia

Cliff S. Thrasher, Executive VP, CFO and Treasurer, Atlanta, Georgia

Ann P. Daiss, VP, Comptroller, and Chief Accounting Officer, Atlanta, Georgia

Christopher C. Womack, Executive VP, External Affairs, Atlanta, Georgia

Mickey A. Brown, Executive VP, Customer Service Organization, Atlanta, Georgia

Judy M. Anderson, Sr. VP, Charitable Giving, Atlanta, Georgia

James H. Miller III, Sr. VP, General Council, Atlanta, Georgia

Douglas E. Jones, Sr. VP, Fossil and Hydro Generation and Senior Production Officer, Atlanta, Georgia

Oscar C. Harper, Vice President, Resource Planning and Nuclear Development, Atlanta, Georgia

Neither GPC nor its corporate parent, Southern Company, is owned, controlled, or dominated by an alien, foreign corporation, or foreign government.

Oglethorpe Power Company

OPC (an Electric Membership Corporation) operating on a not-for profit basis, was organized under the Georgia Electric Membership Corporation Act (Official Code of Georgia Annotated, Title 46, Chapter 3, Article 4) and other applicable laws of the State of Georgia.

The names and addresses of OPC's principal officers and the members of its governing body, all of whom are citizens of the United States, are as follows:

Directors

Benny W. Denham Chairman SW Region Director	2100 East Exchange Place Tucker, Georgia 30084
Sam Rabun Vice Chairman Central Region Director	2100 East Exchange Place Tucker, Georgia 30084
Marshall Millwood NE Region Director	2100 East Exchange Place Tucker, Georgia 30084
Larry N. Chadwick NW Regional Director	2100 East Exchange Place Tucker, Georgia 30084
M. Anthony Ham SE Regional Director	2100 East Exchange Place Tucker, Georgia 30084
H. B. “Bud” Wiley Jr. At-Large Director	2100 East Exchange Place Tucker, Georgia 30084
Gary A. Miller Managing Director	2100 East Exchange Place Tucker, Georgia 30084
Jeffrey W. Murphy Managing Director	2100 East Exchange Place Tucker, Georgia 30084
C. Hill Bentley Managing Director	2100 East Exchange Place Tucker, Georgia 30084
Gary W. Wyatt Managing Director	2100 East Exchange Place Tucker, Georgia 30084
Robert E. Rentfrow Managing Director	2100 East Exchange Place Tucker, Georgia 30084
Wm. Ronald Duffy Outside Director	2100 East Exchange Place Tucker, Georgia 30084
John S. Ranson Outside Director	2100 East Exchange Place Tucker, Georgia 30084

Principal Officers

Thomas A. Smith President and CEO	2100 East Exchange Place Tucker, Georgia 30084
Michael W. Price Chief Operating Officer	2100 East Exchange Place Tucker, Georgia 30084
Elizabeth B. Higgins Chief Financial Officer	2100 East Exchange Place Tucker, Georgia 30084
Jami Reusch Vice President, Human Resources	2100 East Exchange Place Tucker, Georgia 30084
W. Clay Robbins Sr. Vice President, Government Relations and Chief Administrative Officer	2100 East Exchange Place Tucker, Georgia 30084
Clarence D. Mitchell Senior Vice President, Contract Operations & Environmental	2100 East Exchange Place Tucker, Georgia 30084
George B. Taylor, Jr. Senior Vice President, Strategic Initiatives	2100 East Exchange Place Tucker, Georgia 30084
Billy Ussery Senior Vice President, Member and External Relations	2100 East Exchange Place Tucker, Georgia 30084
Dale R. Murphy Vice President, Contracts and Capital Projects	2100 East Exchange Place Tucker, Georgia 30084
Anne F. Appleby Vice President, Treasurer	2100 East Exchange Place Tucker, Georgia 30084
James A. Messersmith Senior Vice President, Plant Operations	2100 East Exchange Place Tucker, Georgia 30084
Herbert Short General Counsel	2100 East Exchange Place Tucker, Georgia 30084
Patricia N. Nash Secretary	2100 East Exchange Place Tucker, Georgia 30084

Municipal Electric Authority of Georgia

MEAG is public corporation and an instrumentality of the State of Georgia, a body corporate and politic, created by the General Assembly of the State of Georgia in its 1975 Session (Official Code of Georgia Annotated, Title 46, Chapter 3, Article 3 O.C.G.A § 46-3-110 et. seq.).

The names and addresses of MEAG's principal officers and the members of its governing body, all of whom are citizens of the United States, are as follows:

Officers

Robert P. Johnston President and CEO	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
Mary G. Jackson Senior Vice President and Chief Accounting Officer	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
James E. Fuller Senior Vice President and Chief Financial Officer	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
Charles B. Manning, Jr. Senior Vice President Participant and Corporate Affairs	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
Steven M. Jackson Vice President, Power Supply	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
Gary M. Schaeff Vice President, Transmission	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686
J. Scott Jones Vice President, Audit and Risk Management	1470 Riveredge Parkway NW Atlanta, Georgia 30328-4686

Authority Members (Governing Board)

Patrick C. Bowie, Jr., Chair	200 Ridley Avenue LaGrange, Georgia 30241
L. Keith Brady, Vice-Chair	25 LaGrange Street Newnan, Georgia 30263
Roland C. Stubbs, Jr. Secretary-Treasurer	115 Mims Road Sylvania, Georgia 30467
Kelly E. Cornwell Board Member	P.O. Box 248 Calhoun, Georgia 30703-0248
John H. Flythe Board Member	P.O. Box 218 / 805 S. Grant St. Fitzgerald, Georgia 31750
Robert W. Lewis Board Member	675 N. Marietta Pkwy Marietta, Georgia 30060-1528
Steve A. Rentfrow Board Member	P.O. Box1218 Cordele, Georgia 31010-1218
Robert C. Sosebee Board Member	1953 Homer Road Commerce, Georgia 30529
Kerry S. Waldron Board Member	106 South Hutchinson Avenue Adel, Georgia 31620

City of Dalton, Georgia

The names and addresses of Dalton's governing body (Councilmen) and principal officers (Mayor, City Administrator, and Clerk) and the names and addresses of Dalton Utilities' governing body (Commissioners) and principal officers (Chairman, President/Chief Executive Officer and Secretary), all of whom are citizens of the United States, are as follows:

Councilmen (City of Dalton)

Ray Elrod Mayor	1508 Rio Vista Drive Dalton, Georgia 30722
Bobby Joe Grant	2204 Rocky Face Circle Dalton, Georgia 30720
Terry Christie	402 S. Thornton Ave. #10 Dalton, Georgia 30720
Dick Lowery	113 N. Castle Road Dalton, Georgia 30720
Charles Bethel	J&J Industries, Inc. P.O. Box 1287 Dalton, Georgia 30722-1287

Officers (City of Dalton)

Ray Elrod Mayor	1508 Rio Vista Drive Dalton, Georgia 30720
Butch Sanders City Administrator	City Hall P.O. Box 1205 Dalton, Georgia 30722-1205
Bernadette Chattam City Clerk	City Hall P.O. Box 1205 Dalton, Georgia 30722-1205

Commissioners (Dalton Utilities)

Norman D. Burkett Chairman	2209 Rocky Face Circle Dalton, Georgia 30720
Lamar Hennon Vice Chairman	Carpets of Dalton/Home Show Place 3010 Old Dug Gap Road Dalton, Georgia 30720
Walter Parsons	1604 Reinhardt Drive Dalton Georgia, 30720
George Mitchell	1918 Tiffany Lane Dalton, Georgia 30722-1166
Smith Foster	Plantex Machinery, Inc. P.O. Box 1761 Dalton, Georgia 30722-1761

Officers (Dalton Utilities)

Norman D. Burkett Chairman	2209 Rocky Face Circle Dalton, Georgia 30720
Don Cope President/Chief Executive Officer	1200 V. D. Parrott, Jr. Parkway Dalton, Georgia 30720
Smith Foster	Plantex Machinery, Inc. P.O. Box 1761 Dalton, Georgia 30722-1761

1.1.5 CLASS OF LICENSE, USE OF THE FACILITY, AND PERIOD OF TIME FOR WHICH LICENSE IS SOUGHT

SNC requests renewal of the Class 103 operating licenses for VEGP Units 1 and 2 (Facility Operating License Nos. 68 and 81, respectively) for a period of 20 years beyond their current expiration dates (midnight, January 10, 2027 for Unit 1 and midnight, February 9, 2029 for Unit 2).

The License Renewal Rule in 10 CFR 54.17(c) states that an application for a renewed operating license may not be submitted earlier than 20 years prior to the expiration of the operating license currently in effect. Since VEGP Unit 2 has less than 20 years of operating experience at the time of the submittal of this application, an exemption to the schedular requirement contained in this regulation is needed. By letter dated January 9, 2007, the NRC granted SNC an exemption to 10 CFR 54.17(c) for VEGP Unit 2, thus allowing the license renewal application for Unit 2 to be submitted concurrently with the application for Unit 1.

Because the current licensing basis is carried forward with the possible exception of some aging issues, SNC expects the form and content of the licenses to be generally the same as they now exist. Thus, SNC, also requests similar extensions of the specific licenses under Parts 30, 40, and 70 that are contained in the current operating licenses.

1.1.6 EARLIEST AND LATEST DATES FOR ALTERATIONS, IF PROPOSED

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

1.1.7 RESTRICTED DATA

The applicant agrees to not permit any individual 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 Parts 25 and/or 95.

1.1.8 REGULATORY AGENCIES

Expenses of SNC which are not direct charges to specific plants are allocated to GPC and others for whom expenses are incurred, as appropriate. GPC is subject to the jurisdiction of the Georgia Public Service Commission and the Federal Energy Regulatory Commission.

Georgia Public Service Commission
244 Washington Street, SW
Atlanta Georgia, 30334

Federal Energy Regulatory Commission
888 1st. St. N.E.
Washington, DC 20426

1.1.9 LOCAL NEWS PUBLICATIONS

News publications in circulation near VEGP which are considered appropriate to give reasonable public notice of the application are as follows:

The Augusta Chronicle
725 Broad Street
Augusta, Georgia 30901

The True Citizen
P.O. Box 948
601 East Sixth Street
Waynesboro, Georgia 30830

1.1.10 CONFORMING CHANGES TO THE STANDARD INDEMNITY AGREEMENT

10 CFR 54.19(b) requires that "Each application must 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 original Indemnity Agreement for VEGP, which was effective as of August 21, 1986, provides that such agreement "shall terminate at the time of expiration of that license specified in Item 3 of the Attachment, which is the last to expire." The license originally listed in Item 3 of the Attachment was SNM-1967. Since August 21, 1986, however, the Indemnity Agreement has been amended in order to add license numbers NPF-61, NPF-68, SNM-1981, NPF-79 and NPF-81 to Item 3 of the Attachment. As a consequence of these amendments, the existing Indemnity Agreement is presently due to terminate at midnight, February 9, 2029, as the last of these licenses expires. SNC requests that conforming changes be made to Item 3 of the Attachment to the Indemnity Agreement (and any other applicable provisions of the Indemnity Agreement and/or the Attachment) in order to make clear that the Indemnity Agreement is extended until the last expiration date of the renewed VEGP operating licenses issued by the Commission in response to this application.

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, SNC will provide an annual update to the application to reflect any information updates and agreements made with the NRC. SNC plans to work with the NRC to establish an application update procedure that is most beneficial toward supporting the NRC's review process.

In accordance with 10 CFR 54.37(b), SNC will maintain a summary list of programs in the UFSAR which are required to manage the effects of aging and the evaluation of time-limited aging analyses for the systems, structures, and components in the scope of license renewal during the period of extended operation.

1.2.2 INCORPORATION BY REFERENCE

The only documents to be incorporated by reference as part of this application are those documents specifically identified as “Documents Incorporated by Reference.” Any document references, either in text or in sections titled “References” 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. L. M. Stinson
Vice President – Fleet Operations Support
Southern Nuclear Operating Company
40 Inverness Center Parkway
P. O. Box 1295
Birmingham AL 35201-1295

Mr. T. E. Tynan
Vice President – Vogtle Project
Vogtle Electric Generating Plant
7821 River Road
Waynesboro, GA 30830

Mr. Stanford M. Blanton, esq.
Balch & Bingham LLP
P. O. Box 306
Birmingham, AL 35201

Mr. Michael A. Macfarlane
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P. O. Box 1295
Birmingham AL 35201-1295

Ms. Moanica M. Caston
Vice President and General Counsel
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
P. O. Box 1295
Birmingham, AL 35201-1295

1.3 PURPOSE

This document is intended to provide information required by 10 CFR 54 to support the application for renewed operating licenses for Vogtle Electric Generating Plant, Units 1 and 2. The application contains technical information required by 10 CFR 54.21, technical specification changes required by 10 CFR 54.22 (if applicable), and environmental information required by 10 CFR 54.23. This information provides the NRC an adequate basis to make the finding required by 10 CFR 54.29.

1.4 DESCRIPTION OF VOGTLE ELECTRIC GENERATING PLANT

VEGP consists of two Westinghouse pressurized water reactor units located near Augusta, Georgia on the southwest side of the Savannah River, approximately 23 river miles upstream from the intersection of the Savannah River and U.S. Highway 301. The site is in the eastern sector of Burke County, Georgia, and across the river from Barnwell County, South Carolina. The VEGP site is directly across the Savannah River from the Department of Energy Savannah River Site.

The nuclear steam supply system (NSSS) for each of the VEGP units is a pressurized water reactor designed and supplied by Westinghouse Electric Corporation with a licensed net core power output of 3565 MWt. Turbine generator output is approximately 1208 MWe.

The major structures for each unit are the Reactor Containment Building, Turbine Building, Auxiliary Building, Diesel Generator Building, Nuclear Service Cooling Water (NSCW) Towers and Auxiliary Feedwater (AFW) Pumphouse. Additionally, the two units share one Control Building and one Fuel Handling Building.

The Containment Building houses the reactor coolant system, the steam generators, some of the engineered safety features systems, and supporting systems. The Turbine Building houses all equipment associated with the main turbine-generator and other auxiliary equipment, such as air compressors. The Auxiliary Building houses safety systems and necessary auxiliary support systems. The Diesel Generator Building houses the emergency standby diesel generator for each unit. The NSCW towers house the NSCW pumps and associated support equipment for each unit. The AFW pumphouse houses the motor-driven and turbine-driven auxiliary feedwater pumps for each unit. The Control Building houses many of the control and electrical systems, including required support systems directly related to safety or necessary for plant operations. The Fuel Handling Building houses the spent fuel pool and new fuel storage facilities.

1.5 APPLICATION STRUCTURE

The application consists of the following sections:

***Section 1* – Administrative Information**

This section provides a description of the plant and the purpose of the application. It includes the names, addresses, business descriptions, and organization and management descriptions of the applicant and the owners of VEGP, as well as other administrative information.

***Section 2* – Structures and Components Subject to Aging Management Review**

This section contains the scoping and screening methodology, which satisfies the requirements of 10 CFR 54.21(a)(2) to describe and justify the methods used to identify those structures and components subject to an aging management review (AMR).

Also included in this section are the plant-level scoping results, presented in Table 2.2-1 and Table 2.2-2. These tables identify all systems within the scope of license renewal, as well as those systems not within the scope of license renewal.

Screening results are presented in Sections 2.3 through 2.5. The screening results consist of a description of each system within the scope of license renewal, with a list of components which require an aging management review for each system. Boundary drawings which provide details about the portions of each system that are within scope are listed, and links to the actual drawings are provided. The drawings themselves are provided for information only and do not constitute part of this application.

***Section 3* – Aging Management Review Results**

AMR results are presented in tabular form, arranged by system. These tables identify the structures and components which require an aging management review, the aging effects which require management for each structure and component, and the generic component functions for each component type. The programs which manage these aging effects are identified, and a comparison to Reference 1, NUREG-1801 is made.

***Section 4* – Time-Limited Aging Analyses**

Time-limited aging analyses (TLAAs) are identified and discussed in this section, with a disposition method specified for each.

***Appendix A* – Final Safety Analysis Report Supplement**

As required by 10 CFR 54.21(d), the Final Safety Analysis Report (FSAR) supplement contains a summary of programs and activities credited for aging management during the renewal term, as well as a list of TLAAs and their evaluations. Conforming changes to the UFSAR will be made subsequent to approval of the renewed licenses.

***Appendix B* – Aging Management Programs and Activities**

In this section each program credited for managing aging in the renewal term is described, with an analysis of how the program compares to the corresponding program in Reference 1, NUREG-1801. Any major findings resulting from the operating experience review for each program are also discussed.

***Appendix C* – Commodity Group Evaluations**

Appendix C is not used in this application.

***Appendix D* – Required Technical Specification Changes**

This appendix satisfies the requirement in 10 CFR 54.22 to identify technical specification changes or additions necessary to manage the effects of aging during the period of extended operation. No technical specification changes have been identified, so this appendix is not used.

***Appendix E* – Environmental Report Supplement**

This appendix satisfies the requirements of 10 CFR 54.22 to provide a supplement to the environmental report that complies with the requirements of Subpart A of 10 CFR Part 51.

1.6 DEFINITIONS AND ACRONYMS

Acronym	Description
AB	Auxiliary Building
ACI	American Concrete Institute
AFW	Auxiliary Feedwater
AISC	American Institute of Steel Construction
AMP	Aging Management Program
AMR	Aging Management Review
AMSAC	ATWS Mitigation System Actuation Circuitry
ANSI	American National Standards Institute
ART	Adjusted Reference Temperature
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
AWWA	American Water Works Association
BAC`	Boric Acid Corrosion
BWR	Boiling Water Reactor
B&PV	Boiler and Pressure Vessel
CASS	Cast Austenitic Stainless Steel
CCW	Component Cooling Water
CET	Core Exit Thermocouple
CF	Chemistry Factor
CLB	Current Licensing Basis
COPS	Cold Overpressure Protection System
CRDM	Control Rod Drive Mechanism
CR	Condition Report
CRGT	Control Rod Guide Tube
CS	Containment Spray

Acronym	Description
CST	Condensate Storage Tank
CTMT	Containment
CTB	Containment Building
CUF	Cumulative Usage Factor
CVCS	Chemical and Volume Control System
DAW	Dry Active Waste
DBA	Design Basis Accident
DBE	Design Basis Event
DW	Demineralized Water
EDG	Emergency Diesel Generator
ECCS	Emergency Core Cooling System
EFPY	Effective Full Power Years
EHC	Electrohydraulic Control
EOL	End-Of-Life
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
ESF	Engineered Safety Features
FAC	Flow Accelerated Corrosion
F_{en}	Environmental Fatigue Factor
FP	Fire Protection
FPP	Fire Protection Plan
FRRADS	Flood-Retaining Rooms, Alarms, and Drain System
FW	Feedwater
GDC	General Design Criteria
GPC	Georgia Power Company
GSI	Generic Safety Issue
HAZ	Heat-Affected Zone

Acronym	Description
HELB	High Energy Line Break
HE/ME	High Energy/Moderate Energy
HJTC	Heated Junction Thermocouple
HVAC	Heating, Ventilating, and Air Conditioning
HX	Heat Exchanger
I&C	Instrumentation and Control
IEEE	Institute of Electrical and Electronic Engineers
IN	Information Notice
IPA	Integrated Plant Assessment
IGA	Intergranular Attack
ISG	Interim Staff Guidance
ISI	In-Service Inspection
LBB	Leak-Before-Break
LOCA	Loss of Coolant Accident
LOSP	Loss of Offsite Power
LRA	License Renewal Application
MPL	Master Parts List
MSLB	Main Steam Line Break
MWe	Megawatts Electric
MWt	Megawatts Thermal
NEI	Nuclear Energy Institute
NPS	Nominal Pipe Size (in inches)
NRC	Nuclear Regulatory Commission
NSCW	Nuclear Service Cooling Water
NSR	Nonsafety-Related
NSSS	Nuclear Steam Supply System
ODSCC	Outside Diameter Stress Corrosion Cracking

Acronym	Description
OBE	Operating Basis Earthquake
P&ID	Piping and Instrumentation Diagram
PRF	Penetration Room Filtration
PSRF	Nonsafety-Related that can Prevent a Safety-Related Function
PTLR	Pressure-Temperature Limits Report
PTS	Pressurized Thermal Shock
PVC	Polyvinyl Chloride
PW	Pipe Whip
PWR	Pressurized Water Reactor
PWSCC	Primary Water Stress Corrosion Cracking
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RI-ISI	Risk-Informed Inservice Inspection
RMWST	Reactor Makeup Water Storage Tank
RPV	Reactor Pressure Vessel
RT_{NDT}	Reference Temperature for Nil-Ductility Transition
RT_{PTS}	Reference Temperature for Pressurized Thermal Shock
RTS	Reactor Trip System
RVCH	Reactor Vessel Closure Head
RVLIS	Reactor Vessel Level Indicating System
RWST	Refueling Water Storage Tank
RV	Reactor Vessel
SBO	Station Blackout
SCs	Structures and Components
SCC	Stress Corrosion Cracking

Acronym	Description
SER	Safety Evaluation Report
SFP	Spent Fuel Pool
SG	Steam Generator
SGBD	Steam Generator Blowdown
SI	Safety Injection
SMP	Structural Monitoring Program
SNC	Southern Nuclear Operating Company
SR	Safety-Related
SRP	Standard Review Plan
SSCs	Systems, Structures, and Components
SSE	Safe Shutdown Earthquake
SW	Service Water
TLAA	Time-Limited Aging Analysis
TSP	Trisodium Phosphate
UFSAR	Updated Final Safety Analysis Report
USE	Upper-Shelf Energy
VEGP	Vogtle Electric Generating Plant
WCAP	Westinghouse Commercial Atomic Power
WOG	Westinghouse Owner’s Group

1.7 REFERENCES

1. NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Vol. 1 and 2, Revision 1.

SECTION 2 STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

2.0 INTRODUCTION

This section describes the process of identifying the systems, structures and components (SSCs) subject to an aging management review, and presents the results. For those SSCs within the scope of license renewal, 10 CFR 54.21(a)(1) requires that license renewal applicants identify and list the structures and components subject to aging management review. Further, 10 CFR 54.21(a)(2) requires that the methods used to identify these structures and components be described and justified. The information in this section is intended to satisfy these requirements.

Section 2.1 describes the scoping and screening methodology. The method used by VEGP for scoping and screening is consistent with the approach described in NEI 95-10, *Industry Guidelines for Implementing the Requirements of 10 CFR 54 – The License Renewal Rule*, Revision 6, June 2005. Table 2.1.3 provides the definitions for the intended functions used throughout Sections 2 and 3 of this application.

Section 2.2 provides the plant-level scoping results of the assessment. Table 2.2-1 identifies the systems and structures within the scope of license renewal. The systems and structures not within the scope of license renewal are identified in Table 2.2-2.

The system-level scoping results and identification of the components and structural components subject to an aging management review are contained in the following sections:

Section 2.3 presents the scoping and screening results for the in-scope mechanical systems,

Section 2.4 presents the scoping and screening results for in-scope structures, and

Section 2.5 presents the scoping and screening results for the in-scope electrical/I&C systems.

The information provided in this section satisfies the requirement contained in 10 CFR 54.21(a)(1) to identify and list those structures and components subject to an aging management review.

2.1 SCOPING AND SCREENING METHODOLOGY

This section describes the VEGP process used to identify systems, structures and components (SSCs) subject to aging management review. The process includes both "Scoping" and "Screening".

- "Scoping" is performed to identify the plant systems and structures which perform intended functions as defined in 10 CFR 54.4(a)(1), (2) and (3).
- "Screening" is performed to identify the components associated with the in-scope systems and structures that are subject to aging management review as defined by 10 CFR 54.21(a)(1) and (2).

Scoping and screening has been performed consistent with the requirements of 10 CFR 54, the Statements of Consideration related to the license renewal rule, and the guidance provided in NEI 95-10, *Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule*, Revision 6.

Section 2.1.1 provides the applicable regulatory requirements from 10 CFR 54 applicable to the scoping and screening process.

Section 2.1.2 discusses the VEGP scoping methodology.

Section 2.1.3 discusses the VEGP screening methodology.

Section 2.1.4 discusses the consideration of the NRC staff's license renewal interim staff guidance (ISG) documents in the VEGP application.

Section 2.1.5 discusses the evaluation of Generic Safety Issues (GSIs).

Section 2.1.6 provides conclusions for Section 2.1.

2.1.1 REGULATORY REQUIREMENTS

Scoping:

Systems, structures, and components which satisfy the criteria in 10 CFR 54.4(a)(1) - (3) are within the scope of license renewal (LR). 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."

Screening:

The screening process is defined by the criteria in 10 CFR 54.21(a)(1) and (2) for determining the SSCs in the scope of license renewal that are subject to aging management review.

The aging management review (AMR) process is defined by 10 CFR 54.21(a)(3). The VEGP AMR methodology is discussed in Section 3.0.1.

Specifically, 10 CFR 54.21 states:

Each application must contain the following information:

(a) *An integrated plant assessment (IPA). The IPA must—*

(1) For those systems, structures, and components within the scope of this part, as delineated in § 54.4, identify and list those structures and components subject to an aging management review. Structures and components subject to an aging management review shall encompass those structures and components—

(i) That perform an intended function, as described in § 54.4, without moving parts or without a change in configuration or properties. These structures and components include, but are not limited to, the reactor vessel, the reactor coolant system pressure boundary, steam generators, the pressurizer, piping, pump casings, valve bodies, the core shroud, component supports, pressure retaining boundaries, heat exchangers, ventilation ducts, the containment, the containment liner, electrical and mechanical penetrations, equipment hatches, seismic Category I structures, electrical cables and connections, cable trays, and electrical cabinets, excluding, but not limited to, pumps (except casing), valves (except body), motors, diesel generators, air compressors, snubbers, the control rod drive, ventilation dampers, pressure transmitters, pressure indicators, water level indicators, switchgears, cooling fans, transistors, batteries, breakers, relays, switches, power inverters, circuit boards, battery chargers, and power supplies; and

(ii) That are not subject to replacement based on a qualified life or specified time period.

(2) Describe and justify the methods used in paragraph (a)(1) of this section.

(3) For each structure and component identified in paragraph (a)(1) of this section, demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation.

2.1.2 SCOPING METHODOLOGY

General Scoping Process

NEI 95-10, *Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule*, Revision 6, June 2005 (Ref. 2), provides industry guidance for determining what SSCs are in the scope of license renewal. The process used to determine the SSCs in the scope of license renewal for VEGP followed the recommendations of NEI 95-10.

Consistent with NEI 95-10, the VEGP scoping process developed a comprehensive list of plant systems and structures. This list was developed primarily from the VEGP design criteria documents, Maintenance Rule Database, plant drawings, and the UFSAR. Other resources, such as the VEGP equipment databases, were used as necessary.

For the VEGP license renewal scoping effort, systems and structures were defined based on the numbering scheme used in the plant documentation and the UFSAR descriptions. Some of the individual systems and structures were later grouped, similar to the groupings used in NUREG-1801, into “LRA Systems” to facilitate the component-level screening process and presentation of the aging management review results. The system numbers and groupings are included in the plant-level scoping results tables in Section 2.2.

The next step in the process was evaluation of systems and structures with respect to the 10 CFR 54.4 scoping criteria. If any part of a system or structure met any of the license renewal scoping criteria, the system or structure was included in the scope of license renewal. The system and structure scoping results included an overall system/structure description, an evaluation of each of the 10 CFR 54.4 scoping criteria and the basis for the conclusion reached. Discussion of the VEGP process used in evaluating each license renewal scoping criterion is provided in Sections 2.1.2.1, 2.1.2.2, and 2.1.2.3.

Scoping Boundaries / Boundary Drawings

Evaluation boundaries were developed to document the system and structure-level scoping determinations and to define the in-scope SSCs to support the subsequent screening and aging management review processes. The boundaries for the in-scope systems and structures were defined and documented in a manner for each discipline that assured the in-scope SSCs were included in the screening process, and that any duplication in the screening process would be minimized. Boundary drawings/diagrams are discipline-specific and were developed for certain boundaries to identify in-scope SSCs.

For the mechanical scoping effort, summary-level boundary descriptions were developed, along with a set of license renewal mechanical boundary drawings. The mechanical boundary drawings were developed from the VEGP piping and instrumentation diagrams and show the mechanical components within the scope of license renewal, including those components that are only in-scope under the 10 CFR 54.4(a)(2) criterion, using color-coding. End points for in-scope portions are clearly delineated. Notes have been added to the drawings where necessary to clarify the endpoints when they do not occur at a component or VEGP feature already depicted on the drawing.

For the structural scoping effort, summary-level boundary descriptions were developed. Generally, the VEGP scoping process used a “spaces” approach in establishing the evaluation boundaries. With few exceptions, the scoping for a building or structure is the entire building. Individual license renewal drawings were not created for structures and were not necessary since the spaces approach was being used. A single boundary drawing based on the site plot plan drawing was created, however. This license renewal structural boundary drawing shows the in-scope structures using color-coding, and displays the spatial relationship of the plant structures to one another.

For the electrical scoping effort, boundary drawings were not needed since the screening was performed using a “Plant-Wide Spaces Approach.” This approach is discussed in Section 2.1.3.3. A diagram showing the in-scope portion of the offsite power system for Station Blackout was provided, however (see Figure 2.1.2.3.5-1**)**.

Documentation Sources

The VEGP scoping process used various documents during the scoping and screening process. These documentation sources included:

- Design Criteria Documents
- UFSAR
- Plant drawings
- Maintenance Rule Scoping Documents
- Technical Specifications and Bases
- Safety Evaluation Reports
- Equipment Databases
- Master List of EQ Equipment
- Station Blackout Analysis Report
- Licensing correspondence
- Vendor documents

Supplemental DBE Review of the UFSAR

As part of the scoping methodology, a supplemental review of the UFSAR was performed to assure the scoping results had properly considered the broad set of design basis events (DBEs) as described by the Rule. DBEs are defined 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 described under 10 CFR 54.4(a)(1). The UFSAR identifies the design basis event analyses for VEGP.

SNC conducted a search for events which could impact scoping. UFSAR Chapters 6 and 15 are the main source of VEGP 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. Events were also identified within other UFSAR chapters. The VEGP UFSAR review identified the broad set of DBEs in the VEGP CLB, and confirmed that the VEGP LR scoping process had evaluated the associated SSCs consistent with the criteria of the Rule.

Information on the VEGP process used to evaluate each of the specific license renewal scoping criteria is provided in the following sections.

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

SSCs that perform safety functions as defined in 10 CFR 54.4(a)(1) are within the scope of license renewal. The determination of safety-related SSCs was in accordance with the 10 CFR 54.4(a)(1) criterion. Aids in making the determination included the VEGP project classification designators (VEGP UFSAR Section 3.2.2.1) which are used in the plant documentation, the safety design bases discussions in the design criteria documents, the safety evaluation discussions in the UFSAR, and the safety-related determination results for the Maintenance Rule scoping.

UFSAR Section 3.2.1.1 defines the VEGP SSCs classified as safety-related Seismic Category 1 as those necessary to ensure:

- The integrity of the reactor coolant pressure boundary;
- The capability to shut down the reactor and maintain it in a safe shutdown condition; or
- The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100.

This is the same as 10 CFR 54.4 with the exception of the guidelines cited for off-site exposures. 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). The exposure guidelines of 10 CFR 50.34(a)(1) are not applicable because the VEGP construction permit was issued before January 10, 1997. The exposure guidelines of 10 CFR 50.67(b)(2) address the use of alternate source terms, which are also not applicable under the VEGP CLB. Therefore, use of the VEGP project classification designators was consistent with the 10 CFR 54.4(a)(1) scoping criterion.

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

The 10 CFR 54.4(a)(2) criterion requires that nonsafety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for safety-related SSCs be included in the scope of license renewal. The VEGP methodology for identifying the SSCs that meet the 10 CFR 54.4(a)(2) criterion was based on, and was consistent with, the guidance provided in Appendix F of NEI 95-10, Revision 6. This guidance has been endorsed by the NRC in Revision 1 to Regulatory Guide 1.188.

The VEGP scoping methodology for SSCs meeting the criteria of 10 CFR 54.4(a)(2) considered those failures identified in the CLB and plant-specific operating experience, and industry-wide operating experience specifically applicable to VEGP. The scoping of SSCs under the criteria of 10 CFR 54.4(a)(2) did not consider hypothetical failures that could result from system interdependencies that are not part of the CLB and that have not been previously experienced.

The function of nonsafety-related equipment to establish initial conditions for equipment operation or accident assumptions did not constitute the basis for inclusion in license renewal scope under 10 CFR 54.4(a)(2). Normal plant conditions are established through normal operation and monitoring practices. Malfunctions of nonsafety-related equipment that result in an actuation of safety-related equipment were also not a basis for inclusion in license renewal scope under 10 CFR 54.4(a)(2) since these malfunctions do not result in the loss of a safety-related function.

Based on the license renewal rule, the guidance in Appendix F of NEI 95-10, and previous license renewal applications, the nonsafety-related SSCs that are in scope based on the 10 CFR 54.4(a)(2) criterion fit into the following categories:

- Nonsafety-related SSCs that perform a required function in support of safety-related functions;
- Nonsafety-related SSCs directly connected to safety-related SSCs and relied upon for structural support of safety-related SSCs; and
- Nonsafety-related SSCs whose failure could result in a potential spatial interaction with safety-related SSCs that could prevent accomplishment of a safety function.

The VEGP process for these categories are discussed in the follow sections.

2.1.2.2.1 Nonsafety-Related SSCs That Perform A Required Function In Support Of Safety-Related Functions

At VEGP, SSCs required to perform a function in support of safety-related components are generally classified as safety-related and included in the scope of license renewal under the safety-related criterion, 10 CFR 54.4(a)(1). The UFSAR and other CLB documents were reviewed as part of the scoping effort for each system and structure, to determine whether the system or structure included any nonsafety-related SSCs credited with supporting satisfactory accomplishment of a safety-related function. For the few exceptions where nonsafety-related components are required to remain functional to support a safety function, the system intended function was included in the scoping evaluation and the components were included in scope under the 10 CFR 54.4(a)(2) criterion.

2.1.2.2.2 Nonsafety-Related SSCs Directly Connected To Safety-Related SSCs and Relied Upon For Structural Support Of Safety-Related SSCs

This category is concerned primarily with nonsafety-related piping that is attached to safety-related piping and is part of the seismic qualification for the piping. For VEGP, these nonsafety-related SSCs were included in the scope of license renewal to the extent that they are relied upon for structural support of the safety-related piping and components. Specifically, nonsafety-related piping attached to safety-related piping was included in the scope of license renewal up to and including the seismic anchor as identified in the stress analysis, or to an equivalent anchor or one of the other methods provided for in NEI 95-10, Appendix F. These other methods used to establish the endpoint for scoping of the nonsafety-related “attached” piping were:

- At a combination of restraints or supports such that the nonsafety-related piping and associated structures and components attached to safety-related piping is included in scope up to a boundary point that encompasses two (2) supports (restraints) in each of the three (3) orthogonal directions.

- At 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. The base-mounted component was included in scope as it has a support function for the safety-related piping.

- At the end connection the mates up to a flex hose or expansion joint since the flexible connector effectively decouples the piping system (i.e., does not support or transfer loads across it to connecting piping).

- Include the entire run of nonsafety-related piping in scope. This is an option for nonsafety-related piping runs that are connected at both ends to safety-related piping, and at the end of piping runs.

- At a point where buried piping exits the ground. The ground serves as an anchor since the compacted backfill used at VEGP for the buried piping is well founded on compacted soil that is not susceptible to liquefaction. Per UFSAR Section 2.5.4.15, liquefaction will not occur in compacted backfill at VEGP under SSE conditions.

2.1.2.2.3 Nonsafety-Related SSCs Whose Failure Could Result In a Potential Spatial Interaction with Safety-Related SSCs That Could Prevent Accomplishment of a Safety Function

Nonsafety-related SSCs whose failure could result in a potential spatial interaction with safety-related SSCs that could prevent accomplishment of a safety function were included in the scope of license renewal per NEI 95-10, Appendix F. The following spatial interactions were considered in determining if a nonsafety-related SSC should be included in-scope:

- Physical Impacts (Seismic II/I, Missiles, etc.)
- Flooding and Leak Detection
- High and Moderate Energy Line Postulated Pipe Failures (Pipe Whip, Jet Impingement, Harsh Environment Effects)
- Leakage or Spray
- Environmental Impacts (Freeze Protection, Insulation)

General Discussion:

The approach used for VEGP is consistent with NEI 95-10, Appendix F. Protective features installed to protect safety-related SSCs against spatial interaction with nonsafety-related SSCs are credited in the plant design (e.g., whip restraints, spray shields, supports, missile barriers, flood barriers). These features are included within the scope of license renewal and for VEGP, are typically safety-related. These protective features are typically associated with the structure and therefore addressed in the civil/structural scoping. A spaces approach was used for scoping the structural features of the Seismic Category I structures, ensuring these features are included in-scope.

Physical Impact (Seismic II/I, Missiles, etc):

Consistent with NEI 95-10, Appendix F, the nonsafety-related structures and supports for SSCs with a potential for spatial interaction with safety-related SSCs (e.g., Seismic II/I) are included in scope based on the criterion of 10 CFR 54.4(a)(2). These supports and components are addressed in a commodity fashion within the civil/structural section.

Missiles can be generated from internal or external events such as failure of rotating equipment. Typically, inherent structural features (such as the concrete walls or steel covers) or engineered structures (e.g., missile doors) are credited to protect safety-related equipment from missiles and are classified as safety-related. The features not already included in-scope as safety-related are included based on the criterion of 10 CFR 54.4(a)(2).

Some fan housings are credited in the CLB for protecting safety-related SSCs from a fan blade missile event. These housings have been included in scope based on the criterion of 10 CFR 54.4(a)(2) and are identified in the scoping for the ventilation systems.

Failures of floating internal tank diaphragms inside of safety-related tanks were identified as a 10 CFR 54.4(a)(2) concern from operating experience. In some cases, these diaphragms are nonsafety-related. Diaphragm degradation or failure of flotation devices have the potential to impact the safety-related system. Consequently, internal tank diaphragms inside of safety-related tanks have been included in the scope of license renewal under the mechanical system scoping.

Flooding and Leak Detection

Nonsafety-related flood barriers (e.g., walls, curbs, dikes, doors, seals) that protect safety-related SSCs from flooding effects were included in scope under the criterion of 10 CFR 54.4(a)(2) in the structural scoping.

Some nonsafety-related floor drains are relied upon to assure that leaks in certain spaces do not cause failure of safety-related SSCs, either in the same space, or in other spaces. The Auxiliary Building Flood-Retaining Rooms, Alarms, and Drains System is designed to retain post-LOCA radioactive liquid leakage within certain flood-retaining rooms. Some nonsafety-related portions of the system are relied upon to perform this function. Some room and sump level switches are credited in the CLB for leakage detection. These nonsafety-related SSCs were included in scope under 10 CFR 54.4(a)(2) in the mechanical scoping for the system.

High Energy Line Breaks (Pipe Whip, Jet Impingement, Harsh Environment Effects):

The VEGP CLB defined the expression "high energy" in VEGP UFSAR Section 3.6. High-energy piping includes those systems or portions of systems in which the maximum normal operating temperature exceeds 200°F or the maximum normal operating pressure exceeds 275 psig. Piping systems or portions of systems pressurized above atmospheric pressure during normal plant conditions and not identified as high energy are considered moderate energy. Piping systems that exceed 200°F or 275 psig for about 2 percent or less of the time the system is in operation or that experience high-energy pressures or temperatures for less than 1 percent of the plant operation time are considered moderate energy."

VEGP nonsafety-related high-energy piping (not already in scope) with a potential for spatial interaction (pipe whip, jet impingement, physical impacts due to high energy system pipe failure, environmental effects) with vulnerable safety-related equipment were included in the scope of license renewal consistent with the CLB under the 10 CFR 54.4(a)(2).criterion. The mitigative features (whip restraints, jet impingement shields) were included in the structural scope. The scoping of moderate energy piping for leakage or spray effects is discussed below.

Leakage or Spray:

Moderate and low energy nonsafety-related piping that was not otherwise in-scope was placed in-scope if a spatial relationship with safety-related SSCs existed, such that if the pressure boundary of the piping failed, a detrimental impact on a safety-related SSC could result.

The process for identifying non-attached nonsafety-related piping and mechanical components involved a plant spaces approach, including both walkdowns and examination of plant layout drawings. Liquid-bearing nonsafety-related SSCs were considered to be within the scope of 10 CFR 54.4(a)(2) if the nonsafety-related SSCs were located within the same space as safety-related SSCs and the safety-related SSCs could be degraded due to spray. Physical barriers (e.g., walls, ceilings, and floors) define the space, and any interaction between safety-related and nonsafety-related SSCs was limited to the space. For lines at atmospheric pressure such as condensate drain lines, only leakage was assumed. These lines were included in the scope of license renewal if safety-related SSCs located below the lines could be degraded due to leakage. Additionally, in evaluating the impact of sprays and leaks on mechanical, structural, and electrical SSCs, no limitation was placed on the duration of the spray or leak.

Components that did not contain liquids or steam were determined to not adversely affect safety-related SSCs due to leakage. Operating experience indicated that nonsafety-related components containing only air or gas have not experienced failures due to aging that could impact the ability of safety-related equipment to perform required safety functions. Therefore, a system containing only air or gas was not in the scope of license renewal based on the potential for spray or leakage. Additionally, stainless steel lines that are normally dry (only occasionally liquid bearing) such as sloped drain lines were determined to not adversely affect safety-related SSCs due to leakage. Failures of these lines were determined to be hypothetical; operating experience supports this conclusion.

Environmental Impacts (Freeze Protection, Insulation)

Freeze protection for safety-related small diameter lines was identified previously by the Maintenance Rule scoping as a nonsafety-related failure that could prevent a safety-related function. Consequently, freeze protection for these lines was included in the scope of license renewal under the 10 CFR 54.4(a)(2) criterion. The heat tracing is under the electrical and I&C systems review. The insulation is included under the mechanical scoping.

Piping insulation in containment penetrations was identified as being required to keep the local concrete temperatures below 200 °F (UFSAR Section 3.8.2.1.5). Also, for certain HVAC systems, thermal insulation is credited in the calculations that assure that the HVAC systems will perform their safety- related functions. Therefore, such insulation was included in the mechanical scope of license renewal under the 10 CFR 54.4(a)(2) criterion.

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

This section discusses the approach used to identify the SSCs in the scope of license renewal based on this criterion. 10 CFR 54.4(a)(3) states that the scope of license renewal includes the SSCs relied on in safety analyses or plant evaluations to demonstrate compliance with the Commission's regulations for the following regulated events: 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).

The VEGP scoping of SSCs for the 10 CFR 54.4(a)(3) regulated events did not include hypothetical failures or second, third, or fourth-level support systems. This is consistent with the NRC guidance on cascading for 10 CFR 54.4(a)(3) as described in Table 2.1-2 of NUREG-1800.

The approaches used for these regulated events [10 CFR 50.48, 10 CFR 50.49, 10 CFR 50.61, 10 CFR 50.62, and 10 CFR 50.63] are described in the following sections.

2.1.2.3.1 <u>10 CFR 50.48 - Fire Protection (FP)</u>

The VEGP SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with 10 CFR 50.48, "Fire Protection", have been included in the scope of license renewal under the 10 CFR 54.4(a)(3) criterion.

10 CFR 50.48 stipulates that each licensee must have a Fire Protection Plan that satisfies Criterion 3 of Appendix A to 10 CFR 50. The plan must describe the overall fire protection (FP) program for the facility including an outline of the plans for fire protection, fire detection and suppression capability, and limitation of fire damage. The plan must also describe specific features necessary to implement the program, including fire detection, automatic and manually-operated suppression systems, and the means to limit fire damage to SSCs important to safety so that the capability to safely shut down the plant is ensured.

The VEGP CLB documents applicable to the VEGP Fire Protection Program, such as VEGP UFSAR Section 9.5.1 and Appendices 9A and 9B, were reviewed to determine the SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with 10 CFR 50.48. Based on the VEGP CLB, SNC placed in-scope for license renewal those SSCs credited with fire prevention, detection, and mitigation for areas containing equipment important to safety, and for radwaste areas where credited in the CLB to minimize the release potential from a fire. SNC also included in the scope of license renewal those SSCs relied upon in the CLB to maintain the ability to perform reactor plant safe shutdown functions in the event of a fire. Other fire protection program requirements and features, such as those provided for economic property loss considerations, do not form part of the basis for 10 CFR 50.48 compliance and therefore are not within the scope of license renewal.

2.1.2.3.2 10 CFR 50.49 - Environmental Qualification (EQ)

10 CFR 50.49 defines environmental qualification requirements for electrical equipment important to safety that is not located in a mild environment (i.e., located in a harsh environment). For VEGP, the "Master List of Safety-Related Equipment Located In A Harsh Environment" (known as the EQ Master List) defines the electrical equipment subject to the requirements of 10 CFR 50.49. The electrical components on the EQ Master List have been included in the scope of license renewal for EQ under the 10 CFR 54.4(a)(3) criterion.

2.1.2.3.3 10 CFR 50.61 - Pressurized Thermal Shock (PTS)

Systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events", are within the scope of license renewal.

Based upon a review of the VEGP design basis documentation, only the reactor vessels and the reactor vessel internals credited to reduce fast neutron fluence are relied upon for protection against pressurized thermal shock. The RT_{PTS} values for the period of extended operation have been evaluated as a TLAA is Section 4.2.3. The results of this evaluation demonstrated that the VEGP reactor vessel materials will not exceed the screening criteria specified in 10 CFR 50.61 through the end of the period of extended operation. As a result, no flux reduction programs or modifications to equipment, systems, or operating procedures are necessary.

The reactor vessels and the reactor vessel internals structures credited to reduce fast neutron fluence have been included in the scope of license renewal for PTS under the 10 CFR 54.4(a)(3) criterion.

2.1.2.3.4 10 CFR 50.62 - Anticipated Transient Without Scram (ATWS)

The ATWS Rule requirements for a Westinghouse PWR are defined in 10 CFR 50.62(c). The Rule requires that each pressurized water reactor must have equipment from sensor output to final actuation device that is diverse from the reactor trip system, that will automatically initiate the auxiliary (or emergency) feedwater system and a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform its function in a reliable manner and be independent from the existing reactor trip system.

The ATWS (anticipated transient without scram) mitigation system actuation circuitry (AMSAC) is a key component for meeting these requirements at VEGP. The AMSAC continuously monitors main feedwater flow, which is an anticipatory indication of a loss of heat sink, and initiates certain functions when the flow drops below a predetermined setpoint in three of the four main feedwater lines for a delayed amount of time (dependent on turbine load). These initiated functions are the tripping of the turbine, the initiation of auxiliary feedwater, and isolation of the steam generator blowdown and sample lines. The AMSAC is described in VEGP UFSAR Section 7.7.1.11.

The AMSAC and other SSCs relied on in analyses or plant evaluations to sense, initiate, and perform these required functions have been included in the scope of license renewal for ATWS under the 10 CFR 54.4(a)(3) criterion.

2.1.2.3.5 10 CFR 50.63 - Station Blackout (SBO)

Each nuclear power plant must be able to cope with a station blackout (complete loss of AC power to essential and nonessential switchgear buses) for a specified duration and recover. For VEGP, SBO is defined in VEGP UFSAR Section 8.4 as a loss of offsite power (LOSP) on both units concurrent with the simultaneous failures of emergency diesel generators A and B on one unit. The coping duration of the SBO event for VEGP was determined to be 4 hours, which is the maximum time required to restore onsite emergency AC power or offsite power to the emergency busses.

The functions relied upon during the SBO coping phase are described in UFSAR Section 8.4. These functions include RCS isolation, Main Steam System isolation and decay heat removal using the atmospheric relief valves, turbine driven auxiliary feedwater pump operation to supply water from the condensate storage tank to the secondary side of the steam generators, station batteries, required instrumentation, appropriate containment integrity, and emergency lighting. The VEGP SSCs relied on in the analyses and plant evaluations for coping with an SBO event, and the systems containing these components, have been included in the VEGP scope of license renewal under the 10 CFR 54.4(a)(3) criterion.

In addition to the SSCs required to cope with a SBO event, per the guidance provided in Chapter 2 of NUREG 1800, Rev. 1, the SSCs required to recover from a SBO event are in the scope of license renewal for compliance with 10 CFR 50.63. Recovery is by restoration of either offsite power or onsite emergency AC power. For VEGP, this scope includes the plant system portion of the offsite power system used to connect the safety-related buses to offsite power and recover from an SBO event in addition to the onsite emergency power system. VEGP's recovery phase equipment was included in the scope of license renewal consistent with NUREG 1800. For restoration of offsite power, this included the breakers, switches, auxiliary equipment and controls necessary to restore power to the emergency buses fed by the Reserve Auxiliary Transformers which are each powered by one of the two offsite power circuits (See Fig. 2.1.2.3.5-1). For restoration of onsite emergency power, the emergency diesel generator system has been included in the scope of license renewal for SBO.

In summary, the SSCs required for coping with and recovery from an SBO event have been included in the scope of license renewal under the 10 CFR 54.4(a)(3) criterion.

Plant Vogtle License Renewal

Offsite Power For SBO

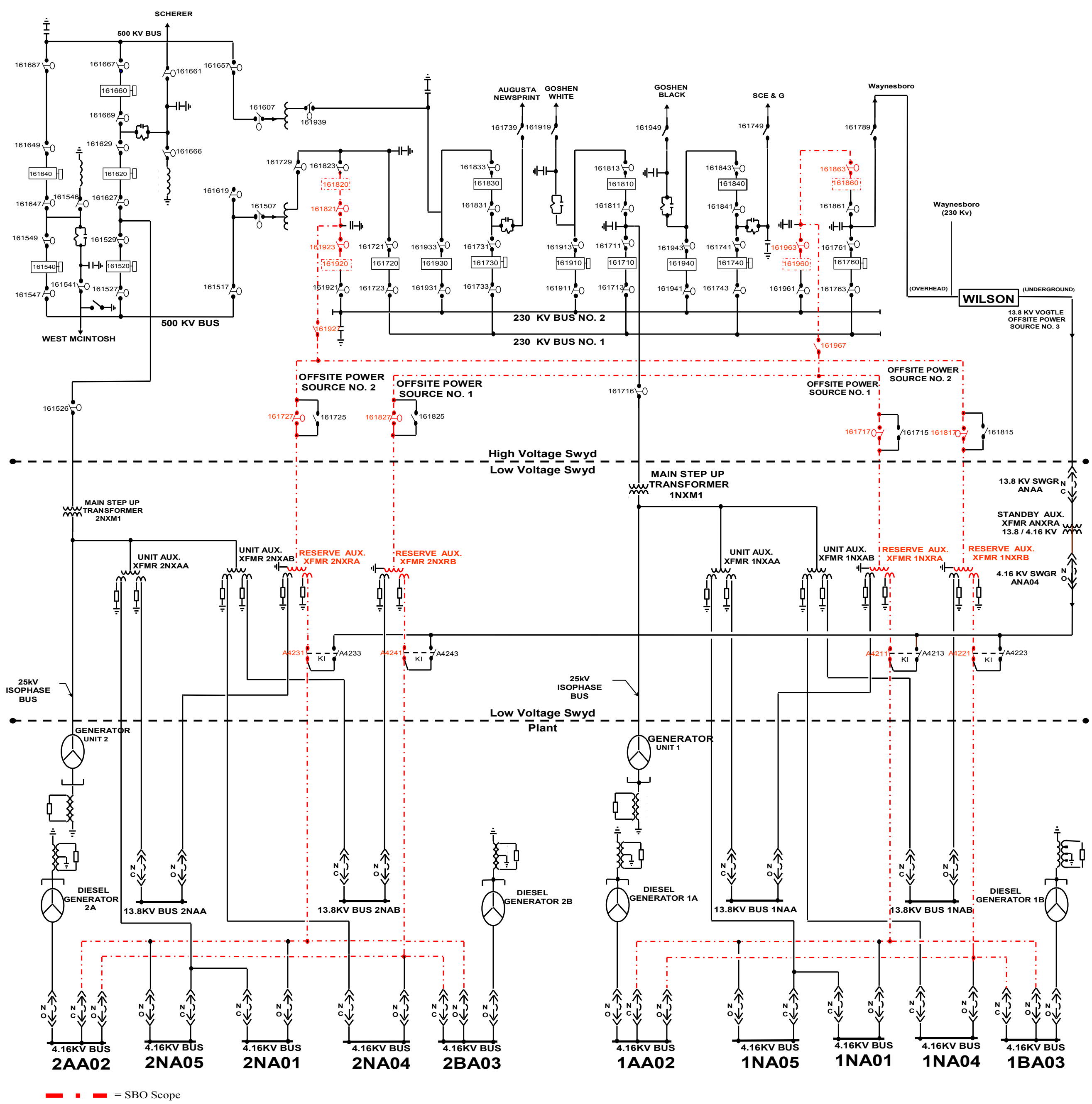

Fig. 2.1.2.3.5-1

2.1.3 SCREENING METHODOLOGY

This section, and the accompanying subsections, describes the process used by SNC to identify the VEGP structures and components (SCs) that require an aging management review. The requirement to identify SCs subject to an aging management review as part of an integrated plant assessment (IPA) is specified in 10 CFR 54.21(a).

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. For simplicity, 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”. Also for simplicity, 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. Components that are not “long-lived” are known as “short-lived”.

The VEGP screening process determines the structures and components subject to aging management review by:

- Listing the in-scope structures and components by component type using the scoping results for a particular system or structure;
- “Screening” the component types for the passive and long-lived criteria; and
- Identifying the intended function(s) performed by the passive and long-lived structures and components by component type for the in-scope system or structure.

The result is a tabulation of the in-scope passive long-lived structures and components that perform intended functions and therefore require aging management review.

The VEGP screening process groups structures and components into component groups (component types) based on similarity of design and purpose. Use of component groups enables evaluation of entire groups of SCs in a single screening evaluation.

NEI 95-10 provides industry guidance for screening structures and components to identify the passive, long-lived structures and components that support an intended function. The screening process for VEGP followed the recommendations of NEI 95-10. “Active” and “short-lived” determinations were made consistent with NEI 95-10. Components or structural elements that were either active or subject to replacement based on a qualified life were ”screened out” as not subject to aging management review.

"Consumables" were evaluated consistent with the guidance provided in NEI 95-10 Table 4.1-2 and NUREG-1800 Table 2.1-3. Consumables have been divided into the following four categories for the purpose of license renewal: (a) packing, gaskets, component seals, and O-rings; (b) structural sealants; (c) oil, grease, and component filters; and (d) system filters, fire extinguishers, fire hoses, and air packs.

(a) Packing, Gaskets, Component Seals, and O-Rings are typically used to provide a leakproof seal when components are mechanically joined together. These items are commonly found in components such as valves, pumps, heat exchangers, ventilation units or ducts, and piping segments. Based on the ASME B&PV Code Section III, these subcomponents are not considered pressure-retaining parts. Therefore, for license renewal, these subcomponents are not relied on to perform a pressure boundary intended function and are not subject to aging management review.

(b) Structural Sealants - Elastomers and other materials used as structural sealants are subject to aging management review if they are not periodically replaced and they perform an intended function, typically supporting a pressure boundary, flood barrier, or rated fire barrier. Compressible joints and seals, seismic joint filler, and roof membranes are included in the aging management review of bulk commodities (Section 2.4.12). Seals, gaskets, and moisture barrier sealant associated with a containment pressure boundary function are included in the aging management review of the Containment Building (Section 2.4.1).

(c) Oil, Grease, And Component Filters - Oil, grease, and component filters have been treated as consumables because either (1) they are periodically replaced, or (2) they are monitored and replaced based on condition.

(d) System Filters, Fire Extinguishers, Fire Hoses, and Air Packs - Components such as system filters, fire hoses, fire extinguishers, self-contained breathing apparatus (SCBA), and SCBA cylinders are considered consumables and are routinely tested, inspected, and replaced when necessary. Fire protection scoping and screening results are presented in Section 2.3.3.19. Fire protection at VEGP complies with the applicable safety standards (e.g., BTP-CMEB 9.5.1, NFPA 10-1981 for fire extinguishers, NFPA 1962-1979 for fire hoses, etc.), which specify performance and condition monitoring programs for these specific components. Fire hoses and fire extinguishers are inspected and hydrostatically tested periodically and must be replaced if they do not pass the test or inspection. SCBA and SCBA cylinders are inspected and periodically tested and must be replaced if they do not pass the test or inspection. Periodic inspection procedures specify the replacement criteria of these components that are routinely checked by tests or inspections. Therefore, while these consumables are in the scope of license renewal, they are not subject to aging management review.

Intended functions are those functions that the components and structures must fulfill to ensure that the supported system or structure continues to perform its function(s) relative to the scoping criteria of 10 CFR 54.4(a)(1), (2), and (3). Structures and components (SCs) may have multiple intended functions. Typical passive structure and component intended functions are provided in NEI-95-10. The intended functions for structures and components used in this application, and their definitions, are listed in Table 2.1.3. The tables in the application may use either the full intended function name or an abbreviation of the name.

VEGP screening was performed separately by each discipline: mechanical, civil / structural, and electrical / I&C. The screening process is described in Section 2.1.3.1 for the mechanical discipline, in Section 2.1.3.2 for the civil / structural discipline, and in Section 2.1.3.3 for the electrical / I&C discipline.

Table 2.1.3 Component and Structure Intended Functions

Intended Function	Definition
Debris Protection	Provide protection from debris
Electrical Insulation	Provide insulation resistance to preclude shorts/grounds and unacceptable leakage current
Environmental Control	Provide environmental control of plant areas not to exceed equipment limitations
Exchange Heat	Provide exchange of heat from one fluid medium to another
Fire Barrier	Provide rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
Fission Product Barrier	Provide pressure boundary or fission product retention barrier to protect public health and safety in the event of any postulated DBEs
Flame Arresting	Prevent flame from ignition of flammable vapors at a vent pipe from propagating back through the vent to the source. Mechanical flame arrestors are filled with metal or ceramic, which absorbs heat from a flashback, quenching it to a temperature below what is needed for ignition. This stops the flame.
Flood Barrier	Provide flood protection barrier (internal and external flooding event)
Flow Direction	Provide spray shield or curbs for directing flow
Flow Distribution	Provide flow pattern or distribution
Flow Restriction	Provide flow restriction or pressure reduction or fixed throttling of process flow

Table 2.1.3 (Cont'd) Component and Structure Intended Functions

Intended Function	Definition
Heat Sink	Provide heat sink during SBO or design basis accidents
HE/ME Shielding	Provide shielding against high energy line breaks and moderate energy line cracks credited in the CLB
Insulate and Support an Electrical Conductor	Insulate an electrical conductor from ground and support it from the mounting structure
Missile Barrier	Provide missile barrier (internally or externally generated)
Moisture Elimination	Provide elimination or reduction of moisture content
Physical Integrity	Provide physical integrity to prevent generation of debris or loose parts which could interfere with a safety-related function
Pipe Whip Restraint	Provide pipe whip restraint
Pressure Boundary	Provide pressure retaining boundary, which includes maintaining mechanical and structural integrity. This component function includes fluid and pressure retention, flow path, structural support, and physical integrity considerations
Provide Electrical Connections	Provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals
Radiation Shielding	Provide shielding against radiation
Reactivity Control	Provide reactivity control (e.g., Boral in racks)

Table 2.1.3 (Cont'd) Component and Structure Intended Functions

Intended Function	Definition
RVI-1	Provide support and orientation of the reactor core
RVI-2	Provide support, orientation, guidance, and protection for incore instrumentation
RVI-3	Provide a passageway for the distribution of reactor coolant flow to the reactor core
RVI-4	Provide a passageway for support, guidance, and protection for incore instrumentation
RVI-5	Provide a secondary core support for limiting the core support structure downward displacement
RVI-6	Provide gamma and neutron shielding for the reactor vessel
Shelter/Protection	Provide shelter/protection to safety-related and/or nonsafety-related components
Source of Cooling Water	Provide a source of cooling water for safe shutdown
Structural Support	Provide structural and/or functional support to safety-related and/or nonsafety-related components which includes maintaining physical integrity and flow path considerations
Water Retention	Retain water or fluid in a structure

2.1.3.1 Screening of Mechanical Systems

For mechanical systems, a systematic process was used to identify the components that require an aging management review. Screening evaluation boundaries were established based on the scoping results. In some cases, individual mechanical systems or portions of systems (e.g., Class 1 portions of non-RCS systems) were grouped together, similar to the groupings used in NUREG-1801, into a single screening evaluation boundary to simplify the component-level screening process and presentation of the AMR results.

The mechanical component screening included the following steps: Identifying the in-scope structures and components and associated component types using the license renewal mechanical boundary information and drawings created during the scoping process; evaluating the component types against the active/passive and long-lived/short-lived criteria of 10 CFR 54.21(a)(1)(i) and (ii); and identifying the component intended functions for the passive and long-lived component types.

For each LRA system, the applicable component types for the components and component groups were identified and listed. The criteria of 10 CFR 54.21(a)(1)(i) and (ii) were applied to identify the passive long-lived component types. Component intended functions were also identified. The components that contribute to the performance of a system intended function, and perform their function without moving parts and without a change in configuration or properties, and are not subject to replacement based on a qualified life or specified time period (i.e. are passive and long-lived) are subject to an aging management review.

2.1.3.2 Screening of Civil Containments, Structures and Component Supports

The screening process was applied to in-scope buildings and civil structures to identify the structural elements to be evaluated in the aging management reviews. Screening evaluation boundaries were established based on the scoping boundary results. In some cases, individual structures were grouped together for screening due to similarity in construction or other common features into a single screening evaluation boundary to simplify the screening process and presentation of the AMR results. A “Component Supports and Bulk Commodities” screening evaluation boundary was also established to address common components within the in-scope structures.

Generally, the VEGP scoping and screening process used a “spaces” approach in establishing the evaluation boundaries. With few exceptions, the scoping and screening boundary for a building or structure is the entire building, including the base slabs, foundations, walls, beams, slabs, and steel superstructure. The various types of structural elements, and materials that make up the buildings and structures were identified and listed. The listing of structural elements is facilitated by grouping components into component groups. Structural components and commodities often do not have unique identifiers such as those given to mechanical components. Therefore identifying structural components and commodities based on materials of construction and functional applications provided a practical means of categorizing them for aging management reviews.

A list of structural components and component groups was developed for each civil/structural evaluation boundary. Most structural elements have no moving parts and do not change configuration or properties. Since structures are inherently passive, and with few exceptions long-lived, the screening of structural components and commodities was based primarily on whether or not they perform an intended function. Structural components that perform an intended function without moving parts and without a change in configuration or properties, and that are not subject to replacement based on a qualified life or specified time period, are subject to aging management review.

2.1.3.3 Screening of Electrical and I&C Components

VEGP uses a "Plant-Wide Spaces Approach" for electrical and I&C screening. Electrical component types are screened on a plant-wide basis without regard to plant system. In limited cases, such as restoration of offsite power following a SBO event, component type identification and evaluation was limited to only the in-scope portion of the systems rather than generically. The VEGP spaces approach used is consistent with the approach described in NEI 95-10, Revision 6. This method provides the most efficient means for determining the electrical and I&C components subject to an aging management review since most of these components are active. A screening evaluation boundary was created which included all of the in-scope electrical and I&C systems, and the electrical and I&C portions of the in-scope mechanical systems. This “Plant-Wide Electrical” boundary permitted the screening evaluation to be consolidated under one system boundary. Using this approach, it was not necessary to create boundary drawings for electrical and I&C systems.

The spaces approach to aging management review is based on areas where bounding environmental conditions are identified. The bounding environmental conditions are applied during aging management review to evaluate the aging effects on electrical component types that are located within the bounding area.

The following sequence of steps and special considerations were followed for identification of electrical and I&C components that require an aging management review.

All electrical and I&C component types in use at VEGP were identified and listed. The listing provided by NEI 95-10 Appendix B, as well as plant-specific document reviews were the basis for this list. Electrical component types were organized into component groups (e.g. breakers, switches, and cables). Individual components were not identified. The electrical and I&C component groups were identified from a review of plant documents, drawings, equipment databases, and interface with the parallel mechanical and civil/structural screening efforts.

Following the identification of the electrical and I&C component commodity groups, the “passive” screening criterion of 10 CFR 54.21(a)(1)(i) was applied to identify component groups that perform their intended function(s) without moving parts or without a change in configuration or properties. These passive components were identified utilizing the guidance of NEI 95-10 and the EPRI License Renewal Electrical Handbook.

The “short-lived” screening criterion of 10 CFR 54.21(a)(1)(ii) was then applied to those specific component groups that were not previously eliminated. The “short-lived” screening criterion found in 10 CFR 54.21(a)(1)(ii) excludes those components or commodity groups that are subject to replacement based on a qualified life or specific time period from the requirements of an aging management review. Electrical components included in the plant environmental qualification (EQ) program are replaced on a specified interval based on a qualified life. Therefore, components in the EQ program do not meet the “long-lived” criteria of 10 CFR 54.21(a)(1)(ii) and are “short-lived” per the regulatory definition. The result is that the aging management reviews involve only non-EQ electrical and I&C components.

The interface of electrical and I&C components with other types of components, and the assessments of these interfacing components, are provided in the appropriate mechanical or civil/structural sections. For example, the assessment of electrical racks, panels, frames, cabinets, cable trays, conduit, and their supports is provided in the civil/structural assessment documented in Section 2.4.

The electrical and I&C components that require an aging management review are the separate electrical and I&C components that are not a part of a larger active component. For example, when screening a switchgear breaker, the wiring, terminal blocks, and connections located internal to a breaker cubicle were considered to be parts of the breaker.

The passive component types that are not subject to replacement based on a qualified life or specified time period are subject to an aging management review. For VEGP the electrical component types that require an AMR include cables, connectors, fuse holders, and various switchyard components.

2.1.4 INTERIM STAFF GUIDANCE

As discussed in NEI 95-10, the NRC has encouraged applicants for license renewal to address proposed Interim Staff Guidance documents (ISGs) in the LRA. ISGs address issues for which clarification or additional staff and industry guidance may be necessary. ISGs have been provided for a number of license renewal issues that affect scoping and screening as well as aging management. However, a large number of previous ISGs were resolved and closed with the issuance of Revision 1 of the NRC license renewal guidance documents (i.e., NUREG-1800, NUREG-1801, Regulatory Guide 1.188) and Revision 6 of NEI 95-10. Where necessary, additional guidance has been incorporated into these revised documents.

The following are the open ISGs: LR-ISG-19B, 2006-01, 2006-02, and 2006-03. All other license renewal ISGs have been closed by the NRC. A discussion of each of the open ISGs follows.

LR-ISG-19B *Proposed Aging Management Program XI.M11-B, Nickel-Alloy Base-Metal Components and Welds in the Reactor Coolant Pressure Boundary*

The NRC license renewal website indicates this ISG is under NRC development and will not be completed until after the NRC approves an augmented inspection program for nickel-alloy base metal components and welds as proposed by the EPRI Materials Reliability Program (MRP). The Nuclear Energy Institute and ERPI-MRP are to develop an augmented inspection program for NUREG-1801, AMP XI.M11-B.

The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations is described in Appendix B.3.14). It manages aging effects on the reactor coolant pressure boundary nickel alloy components and weld materials other than the reactor vessel head penetrations which are managed by the Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations, which is described in Appendix B.3.15. As this issue evolves under the existing regulatory process, the program will be modified, as appropriate, in response to industry initiatives and NRC guidance and requirements.

LR-ISG-2006-01 *Corrosion of the Mark I Steel Containment Drywell Shell*

This ISG is not applicable to VEGP since VEGP is a PWR.

LR-ISG-2006-02 *Proposed Staff Guidance on Acceptance Review for Environmental Requirements*

LR-ISG-2006-02 was issued in draft form by the NRC on February 8, 2007. SNC has reviewed the draft ISG and determined that the Environmental Report has met the guidance of LR-ISG-2006-02. Environmental Report preparation was in accordance with guidance of Supplement 1 to Regulatory Guide 4.2, “Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses.”

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

The SAMA Analyses for VEGP are addressed in Appendix E. This ISG, issued for comment by the NRC, recommends that applicants for license renewal use guidance document NEI 05-01, Rev. A when preparing SAMA analyses. The VEGP SAMA analyses provided as a part of Appendix E are consistent with the guidance of NEI 05-01 as discussed in this ISG.

2.1.5 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, “Standard Review Plan for 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 10 CFR 54.29. This guidance suggests that GSIs and unresolved safety issues (USIs) involving issues related to license renewal aging management reviews or TLAAs should be addressed in the License Renewal Application (LRA).

Based on the NEI and NRC guidance, NUREG-0933 and previous license renewal applications, SNC did not identify any USIs or HIGH- or MEDIUM-priority issues described in NUREG-0933, Appendix B (unresolved GSIs), involving aging effects of structures and components subject to an aging management review or time-limited aging analysis . However, the following resolved/closed GSIs are applicable to license renewal and are addressed in the VEGP license renewal application as described below.

GSI 168 <u>Environmental Qualification of Electrical Equipment</u>

This GSI was resolved with no new requirements for licensees. The staff concluded the existing equipment qualification process was adequate to ensure that I&C cables would perform their intended function. Environmental qualification evaluations of electrical equipment are identified as time-limited aging analyses for VEGP and addressed in Section 4.4.

GSI 190 <u>Fatigue Evaluation of Metal Components for 60-Year Plant Life</u>

This GSI addressed fatigue life of metal components and was closed by the NRC. In the closure letter, however, the NRC concluded that licensees should address the effects of reactor coolant environment on component fatigue life as aging management programs are formulated in support of license renewal. Accordingly, the issue of environmental effects on component fatigue life is addressed in Section 4.3.1.5.

2.1.6 CONCLUSION

The scoping and screening methodology described above was used for the VEGP Units 1 and 2 IPA to identify the systems, structures, and components that are within the scope of license renewal and which require aging management review. The methods are consistent with and satisfy the requirements of 10 CFR 54.4 and 10 CFR 54.21 (a)(1) and (a)(2).

2.2 PLANT-LEVEL SCOPING RESULTS

As described in the Scoping Methodology, the license renewal rule in 10 CFR 54.4 provides the criteria used to determine the systems, structures, and components within the scope of license renewal. All VEGP systems and structures have been evaluated and those systems and structures which meet any of the criteria are considered to be within scope. If only a portion of a system or structure meets any of the criteria, the system or structure is identified as being within the scope of license renewal in the plant-level scoping results. The systems and structures used in the plant-level scoping results are based on the VEGP-specific system and structure assignments described in the plant documentation.

Table 2.2-1 provides the plant-specific list of VEGP systems and structures within the scope of license renewal. This table is comprised of three columns, described as follows:

- Column 1 is the system name. For ease of review and comparison to NUREG 1801, some Vogtle systems and structures have been grouped under “LRA Systems” where appropriate. In general, these “LRA Systems” correspond to systems and structures listed in NUREG 1801 Vol. 2 (or other common characteristics).

- Column 2 provides the VEGP System Number used to identify the system or structure.

- Column 3 provides the Section 2 Scoping Results section number reference.

The section of the application referenced in Column 3 provides a summary description, screening results, and applicable boundary drawing references for the associated system(s) or structure(s). For the electrical and I&C systems, the description summarizes the “spaces approach” evaluation rather than each system.

The boundary drawings are provided separate from the application. The mechanical boundary drawings highlight in-scope mechanical components to indicate the evaluation boundaries. The civil boundary drawing highlights in-scope structures on an overall plant layout. For in-scope electrical and I&C systems, Boundary drawings are not provided for the in-scope electrical and I&C systems since these systems have been evaluated based on the “spaces approach” as described in Section 2.5. However, a figure highlighting the plant system portion of the offsite power system used to connect the safety-related buses to offsite power for recovery from an SBO event is provided in the application to facilitate the staff’s SBO scoping review (refer to Section 2.1.2.3.5).

Table 2.2-2 provides the plant-specific list of VEGP systems and structures not within the scope of license renewal. This table is comprised of the same columns as Table 2.2-1, with the exception that the third column provides the FSAR reference(s) and/or notes (as applicable).

Table 2.2-1 Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Reactor Vessel, Internals, and Reactor Coolant System (1201)		
Reactor Vessel	1201-RPV	2.3.1.1
Reactor Vessel Internals	1201-RVI	2.3.1.2
Reactor Coolant System and Connected Lines *includes the following Systems:*		2.3.1.3
Reactor Coolant System	1201-RCS	
Safety Injection - Class 1 portion	1204-RCS	
CVCS - Class 1 portion	1208-RCS	
Pressurizer	1201-PZR	2.3.1.4
Steam Generators	1201-SG	2.3.1.5
Engineered Safety Features		
Containment Spray System	1206	2.3.2.1
Emergency Core Cooling Systems *includes the following Systems:*		2.3.2.2
Safety Injection – Non-Class 1 portion	1204-ECCS	
Residual Heat Removal	1205	
CVCS System - Portion used by ECCS	1208-ECCS	
Containment Isolation System	2415	2.3.2.3

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Auxiliary Systems		
Fuel Storage Racks - New And Spent Fuel *includes the following Systems:*		2.3.3.1
New Fuel Storage	2201	
Spent Fuel Storage	2202	
Spent Fuel Cooling and Purification System	1213	2.3.3.2
Overhead Heavy & Refueling Load Handling Systems *includes the following Systems:*		2.3.3.3
Containment Building Polar Bridge Crane	1019	
Spent Fuel Cask Bridge Crane	1020	
Fuel Handling & RV Servicing Equipment	2203	
Nuclear Service Cooling Water Systems *includes the following Systems:*		2.3.3.4
Nuclear Service Cooling Water	1202	
Nuclear Service Cooling Water Chemical Injection	1413	
Component Cooling Water System	1203	2.3.3.5
Auxiliary Component Cooling Water System	1217	2.3.3.6
Turbine Plant Cooling Water System	1405	2.3.3.7
River Intake Structure System	1402	2.3.3.8
Compressed Air Systems *Includes the following Systems:*		2.3.3.9
Instrument, Service, and Breathing Air	2401	
Instrument Air	2420	

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Chemical and Volume Control and Boron Recycle Systems *includes the following Systems:*		2.3.3.10
CVCS (Non-ECCS portions)	1208-CVCS	
Boron Recycle	1210	
Ventilation Systems - Control Building (CB) *includes the following Systems:*		2.3.3.11
CB Control Room Area HVAC	1531	
CB Safety Feature Electrical Equipment Room HVAC	1532	
CB Wing Area, Levels A, B, 1 and 2 Normal HVAC	1533	
CB Lab Hood and Laboratory Area Ventilation	1535	
CB Locker and Toilet Exhaust	1537	
CB Cable Spreading Rooms HVAC	1539	
Electrical Penetration Filter Exhaust	1562	
TSC HVAC	1563	
Ventilation Systems - Auxiliary Building (AB) *includes the following Systems:*		2.3.3.12
AB Outside Air Supply and Normal HVAC	1551	
AB Radwaste Area Filter Exhaust and Continuous Exhaust	1553	
AB Engineered Safety Features Room Coolers	1555	
Piping Penetration Filter Exhaust	1561	

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Ventilation Systems – Containment Building (CTB) *includes the following Systems:*		2.3.3.13
Containment Building Air Cooling	1501	
CTB Lower Level Air Circulation	1503	
CTB Preaccess Filter	1504	
CTB Minipurge Supply and Normal Preaccess Purge Supply	1505	
CTB Minipurge Exhaust and Normal Access Purge Exhaust	1506	
CTB Post LOCA Purge Exhaust	1508	
CTB Cavity Cooling	1511	
CTB Reactor Support Cooling	1512	
CTB Auxiliary Air Cooling	1515	
CTB Post-LOCA Cavity Purge	1516	
Ventilation Systems - Fuel Handling Building (FHB) *includes the following Systems:*		2.3.3.14
FHB Normal HVAC	1541	
FHB Post-Accident Exhaust	1542	
Ventilation System - Diesel Generator Building	1566	2.3.3.15
Ventilation System - Auxiliary Feedwater Pump House	1593	2.3.3.16
Ventilation Systems – Miscellaneous *Includes the following Systems:*		2.3.3.17
Electrical Tunnel Ventilation	1540	
Piping Penetration Ventilation	1556	
Fire Protection Facilities HVAC	1584	
Ventilation Systems - Radwaste Buildings	1557	2.3.3.18

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Fire Protection Systems *includes the following Systems:*		2.3.3.19
Fire Protection Water	2301	
Fire Protection Seismic Category I Water	2303	
Fire Protection Halon	2304	
Emergency Diesel Generator System	2403	2.3.3.20
Demineralized Water System	1418	2.3.3.21
Hydrogen Recombiner and Monitoring System	1513	2.3.3.22
Drain Systems *includes the following Systems:*		2.3.3.23
Containment and Auxiliary Building Drain System – Radioactive	1214	
Auxiliary Building Drain System – Nonradioactive	1215	
Auxiliary Building Flood-Retaining Rooms, Alarms, and Drains	1218	
Control Building Drain System	1225	
Fuel Handling Building Drains	1227	
Sanitary Waste and Vent	1406	
Turbine Building Drain System	2412	
Potable and Utility Water Systems *includes the following Systems:*		2.3.3.24
Potable Water	2417	
Utility Water	2419	
Radiation Monitoring System	1609	2.3.3.25
Reactor Makeup Water Storage Tank and Degasifier System	1228	2.3.3.26

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Sampling Systems *includes the following Systems:*		2.3.3.27
Nuclear Sampling System – Liquids	1212	
Nuclear Sampling System – Gaseous	1211	
Turbine Plant Sampling System	1311	
Post-Accident Sampling System	2702	
Auxiliary Gas Systems *includes the following Systems:*		2.3.3.28
Auxiliary Gas System – N_2	2402	
Auxiliary Gas System – H_2	2406	
Chilled Water Systems *includes the following Systems:*		2.3.3.29
Special Chilled Water System	1564	
Normal Chilled Water System	1591	
Essential Chilled Water System	1592	
Waste Management Systems *includes the following Systems:*		2.3.3.30
Backflushable Filter System	1224	
Condensate Cleanup System	1414	
Waste Processing System, Liquid	1901	
Waste Processing System, Gas	1902	
Thermal Insulation	1105	2.3.3.31
Miscellaneous Leak Detection System	1222	2.3.3.32

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Steam and Power Conversion Systems		
Main Steam System	1301	2.3.4.1
Feedwater System *includes the following Systems:*		2.3.4.2
Condensate and Feedwater	1305	
Condensate Chemical Injection	1411	
Feedwater Heater and MSR Drain	1304	
Steam Generator Blowdown System	1407	2.3.4.3
Auxiliary Feedwater Systems	1302	2.3.4.4
Auxiliary Steam System	1322	2.3.4.5
Electrohydraulic Control System	1615	2.3.4.6
Structures and Component Supports		
Containment Structures *includes the following structures:*		2.4.1
Containment Building	2101	
Containment Internal Structures	2148	
Auxiliary, Control, Fuel Handling, and Equipment Buildings *includes the following structures:*		2.4.2
Auxiliary Building	2108	
Equipment Building	2102	
Fuel Handling Building	2109	
Control Building	2111	

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Emergency Diesel Generator Structures *includes the following structures:*		2.4.3
Diesel Generator Buildings	2107	
Diesel Fuel Storage Tank Pump Houses	2131	
Turbine Building	2110	2.4.4
Tunnels and Duct Banks	2144-A	2.4.5
Nuclear Service Cooling Water (NSCW) Structures *includes the following structures:*	2105	2.4.6
NSCW Cooling Towers		
NSCW Valve Houses		
Concrete Tank and Valve House Structures *includes the following structures:*		2.4.7
Reactor Makeup Water Storage Tanks	2128	
Refueling Water Storage Tanks	2129-TANK	
Condensate Storage Tanks and Valve Houses	2130-TANK	
Switchyard Structures *includes the following structures:*		2.4.8
High-Voltage Switchyard	2523	
Low-Voltage Switchyard	2523-L	
Fire Protection Structures	2506	2.4.9

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Radwaste Structures *includes the following structures:*		2.4.10
Radwaste Transfer Tunnel	2165	
Radwaste Transfer Building	2165	
Alternate Radwaste Building	1901-A	
Radwaste Processing Facility	1901-B	
Dry Active Waste Processing Facility	2165	
Dry Active Waste Warehouse	2165	
Auxiliary Feedwater Pump House Structures	2159	2.4.11
Component Supports and Bulk Commodities *includes the following structures:*		2.4.12
Electrical Raceway Supports	2166	
HVAC Duct Supports	2167	
Pipe Supports	2168	
Pipe Whip Restraints	2169	
Raceway System	1810	
Miscellaneous Cranes and Hoists	1022	

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Electrical and I&C Systems		
Electrical and I&C *includes the following Systems and the electrical and I&C portions of the in-scope mechanical systems:*		2.5.1
AC System, 4160 Volts	1804	
AC System, 480 Volts	1805	
120 Volt AC Power System	1807	
Heat Tracing Systems	1817	
Standby Power System	1821	
13.8 KV Switchgear	1825	
ATWS Mitigation System Actuation Circuitry (AMSAC)	1626	
Cable System	1809	
Containment Building Electrical Penetrations	1818	
Containment Isolation System	2415	
Class 1E DC System	1806	
Electrical Protection System	1823	
Engineered Safety Features Actuation System	1620	
Incore Instrumentation	1612	
Fire Detection System	1813	
Lighting	1808	
Nuclear Instrumentation System	1602	
Main Control Board	1601	
Multisystem Panels and Boards	1816	
Plant Auxiliary Control Boards	1624	

Table 2.2-1 (Cont'd) Systems and Structures Within the Scope of License Renewal

System	System No.	Section 2 Scoping Results
Post-Accident Monitoring System	1623	
Offsite Power System	1801	
High-Voltage Switchyard	1826	
Process Control System	1604	
Protection System NSS	1605	
Process Radiation Monitors	2004	
Area Radiation Monitors	2003	
Reactor Control System	1622	
Reactor Instrumentation	1621	
Rod Control Power System	1606	
Sound Power System	1706	
Status Indication Systems - Trip Status Indicating Lights, Group Monitor Status Indicating Lights and System Status Monitor Indicating Lights	1625	
Turbine Protection System	1613	

Table 2.2-2 Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Mechanical Systems		
Equipment Building Tendon Gallery Ventilation System	1524	VEGP UFSAR Section 9.4.9.1
Equipment Building Ventilation System	1526	VEGP UFSAR Section 9.4.9.1
HVAC Systems - Misc. Support & Outside Area Buildings include:		Note 1
Administration Building HVAC System	1581	
Chemical and Electrical Equipment Building HVAC System	1598	
Dechlorination Building HVAC System	1597	
High Voltage Switchyard Switchhouse HVAC System	1580	
Maintenance Building HVAC System	1586	
Miscellaneous Ventilation and Cooling Systems (Note 2)	1590	
Plant Entry and Security Building HVAC System	1583	
Potable Water Equipment Building HVAC System	1579	
Production Warehouse HVAC System	1585	
River Intake Structure HVAC System	1595	
Service Building HVAC System	1582	

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Simulator Building HVAC System	1588	
NSCW Chemical Control Building HVAC System	1599	
Radwaste Health Physics Building HVAC System	1550	
Water Treatment Building HVAC System	1594	
Turbine Building HVAC System	1575	VEGP UFSAR Section 9.4.4
Auxiliary Gas System – O2	2418	VEGP UFSAR Section 9.3.5
Backup Diesel Generator for Outdoor Lighting	2421	Note 4
Circulating Water System	1401	VEGP UFSAR Section 10.4.5
Circulating Water Chemical Injection System	1410	VEGP UFSAR Section 10.4.5.2.3, Section 9.3.7
Condenser-Related Systems include:		
Condenser Air Ejection System	1309	VEGP UFSAR Section 10.4.2
Condenser Tube Cleaning	1419	VEGP UFSAR Section 10.4.1.2, Section 10.4.2.2.1
Condenser Waterbox Cathodic Protection System	2424	Note 3
TB Condenser Vacuum Exhaust Filtration System	1574	VEGP UFSAR Section 9.4.4
Containment Building CRDM Cooling System	1509	VEGP UFSAR Section 9.4.6
Electrical Chase Tunnel Drains	1226	VEGP UFSAR Section 9.3.3

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Equipment Decontamination Facilities	2208	VEGP UFSAR Section 12.5.2.1
Extraction Steam System	1303	VEGP UFSAR Section 10.2.1
Feedwater Pump Turbine Drive Steam System	1306	VEGP UFSAR Section 10.4.7.2.2.11, Section 10.3.2.3.1
Heater Vent System	1310	None
Plant Makeup Water Treatment System	1409	VEGP UFSAR Section 9.2.3
Plant Makeup Water Treatment Waste Neutralization System	1417	VEGP UFSAR Section 9.2.3
Plant Makeup Water Well System	1408	VEGP UFSAR Section 2.4.12.1.3.3
Plumbing	2413	Note 5
Radwaste Solidification Building (RSB) Systems include:		The RSB has been abandoned in place (VEGP UFSAR Section 9.4.3.3)
RSB Radwaste Pump Seal Water System	1423	
RSB Cooling Water System	1422	
RSB Chilled Water System	1549	
RSB Process Area Air Supply and Filter Exhaust System	1546	
RSB SWGR/Motor Control Center Air Cooling System	1548	
RSB Uncontaminated Area HVAC System	1547	
Radwaste Solidification Building Drains	1229	

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Radwaste Vol Reduction and Solidification System	1903	VEGP UFSAR Section 11.4
Turbine Plant Closed Cooling Water System	1404	VEGP UFSAR Section 9.2.10
Turbine-Generator System (TGS)	1323	VEGP UFSAR Section 10.2
T-G Support Systems and Main Generator includes:		VEGP UFSAR Section 10.2, Table 3.2.2-1 (Sheet 44-46)
Main Generator	1328	
Turbine Drain System	1316	
Turbine Lube Oil Storage and Filtration System	1307	
Turbine-Generator Hydrogen and H2 Seal Oil System	1324	
Turbine-Generator Stator Cooling Water System	1326	
Turbine-Generator Carbon Dioxide System	1325	
Turbine-Steam-Bypass-System	1319	VEGP UFSAR Section 10.4.4
Waste Evaporator Steam Supply System	1314	Waste Evaporators and steam supply are abandoned in place. VEGP UFSAR Table 3.2.2-1 (Sheet 97) notes au and av
Waste Water Effluent System	1420	VEGP UFSAR 11.2.3.3, VEGP UFSAR Table 3.2.2-1 (Sheet 48)

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Structures		
Administration Building	2520	VEGP UFSAR Section 1.2.2. Note 6.
Barge Unloading Facility	2127	Notes 6 and 7
Chemical and Electrical Equipment Building	2511	Notes 6, 7, and 8. Supports biocide treatment of the circulating water (VEGP UFSAR Section 9.3.7).
Circulating Water Structures include:		VEGP UFSAR Section 10.4.5. Note 6.
Circ. Water Cooling Towers and Basins	2120	
Circulating Water Canals	2142	
Circulating Water Intake Structure	2126	
Circulating Water Piping	2136	
Construction Silt and Debris Settling Basin	2135	Notes 6 and 7
Dechlorination Building	2524	Notes 6 and 7
Electric Steam Boiler Building	2526	Notes 6 and 9
Maintenance Building	2518	VEGP UFSAR Section 1.2.2 and Note 6
Meteorological Tower	2001	VEGP UFSAR Section 2.3.3
Minor Plant Structures and Pads include:	2147	
Boat Ramp		Notes 6 and 7
Building and Grounds Facility		Notes 6 and 7

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Field Support Building		Note 6
Fire Training Facility		Notes 6 and 7
Hazardous Waste Storage		Notes 6 and 7
Health Physics Building		Note 6
Maintenance Storage Facility		Note 6
Maintenance Shop		Note 6
Modifications and Outage Support Group (MOSG) Support Building		Notes 6 and 7
NSCW Chemical Control Building		Notes 6 and 8. Supports biocide treatment of the NSCW (VEGP UFSAR Section 9.3.7).
Nuclear Operations Admin. Support Building		Notes 6 and 7
Nuclear Operations Paint and Thinner Storage Buildings		Notes 6 and 7
Nuclear Operations Support Complex Storage Buildings		Notes 6 and 7
Nuclear Operations Telecommunications Building		Notes 6 and 7
Nuclear Operations Warehouse		Notes 6 and 7
Nuclear Operations Weld Test Shop		Notes 6 and 7
Outage Maintenance Building		Note 6

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Pads for Onsite Storage Tanks, Outside Equip. and Chemical Storage Areas		Notes 6 and 8
Permanent Potable Water Chlorination Facility & Sodium Hypochlorite Injection Facility		Notes 6 and 8. Supports biocide treatment of the potable water system (VEGP UFSAR Section 9.3.7).
Security House (Plant Entrance Road)		Notes 6 and 7
Security Training Facility		Notes 6 and 7
Vehicle Fueling Facility		Notes 6 and 7
Visitor's Center		Notes 6 and 7
Waste Neutralizing Sumps (Make-up Demin)		VEGP UFSAR Section 9.2.3.2.2.3, Note 6
Waste Water Retention Basins		VEGP UFSAR Section 11.2.3.3, Note 6
NSCW Chlorine Storage Building / Snubber Test & MSIV/MFIV Cleaning Facility	2512	Notes 6 and 8.
Outfall-Structure	2114	VEGP UFSAR Section 1.2.2, Notes 6 and 7
Plant Entry and Security Building (PSEB) and Alternate PESB	2508	VEGP UFSAR Section 1.2.2 and Note 6
Plant Makeup Wells	2121	VEGP UFSAR Section 2.4.12.1.3
Production Warehouse and Warehouse Receiving Bldg	2515	VEGP UFSAR Section 1.2.2 and Note 6
Railroads	2138	None.
River Intake Structure and Intake Canal	2113	VEGP UFSAR Section 2.4.8.1, Section 2.4.2.2, Notes 6 and 7
Roads	2137	None.

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Security Fencing and Gates	2116	VEGP UFSAR Section 13.6, Note 6.
Service Building	2519	VEGP UFSAR Section 1.2.2, Note 6
Sewage Treatment Plant	2119	VEGP UFSAR Section 1.2.2.1, Notes 6 and 7
Storm Drain System	2153	VEGP UFSAR Section 9.3.3.2.3.9, Section 2.4.2.3
Test Water Well	2170	VEGP UFSAR Section 2.4.12.1.3.3
Turbine Building Bridge Crane	1021	The turbine building bridge crane is in a seismic Category 2 structure.
Turbine Generator Pedestal	2151	The turbine-generator pedestal supports the turbine-generator.
Water Treatment (Demineralizer) Building	2514	VEGP UFSAR Section 1.2.2.1 and Note 6. Building supports demineralized water production.

Table 2.2-2 (Cont'd) Systems and Structures Not Within the Scope of License Renewal

System	System No.	VEGP UFSAR Reference(s), Notes
Electrical and I&C Systems		
AC System, 25,000 Volts	1802	VEGP UFSAR Section 8.1.2
Annunciator System	1619	VEGP UFSAR Section 18.1.2.12.6
Digital Metal Impact Monitoring System	1610	VEGP UFSAR Section 4.4.6.4
Emergency Response Facilities Computer System	2701	VEGP UFSAR Section 7.5.1. See system 1623 for PAM System.
Environmental Radiation Monitoring System	2006	VEGP UFSAR Section 1.2.1.9
Full-Length Rod Control	1607	VEGP UFSAR Section 7.7.1
Grounding System	1811	None
Integrated Plant Computer	1627	VEGP UFSAR Table 3.2.2-1 Sheet 81
Integrated Plant Computer Power and I/O System	1618	VEGP UFSAR Table 3.2.2-1 Sheet 81
Iso-Phase Bus System	1822	VEGP UFSAR Table 3.2.2-1 Sheet 85
Non-Class 1E DC System	1806A	VEGP UFSAR Section 8.3.2
PABX System	1702	VEGP UFSAR Section 9.5.2
Personnel Monitoring System	2002	VEGP UFSAR Section 12.5.2
Plant Security System	2502	VEGP UFSAR Section 13.6
Rod Position Indication	1608	VEGP UFSAR Section 7.7.1.3.2
Seismic Monitoring Equipment	2414	VEGP UFSAR Section 3.7.4
Telephone/Page System	1701	VEGP UFSAR Section 9.5.2
Turbine Supervisory Instrumentation	1614	VEGP UFSAR Section 10.2.6

Notes for Table 2.2-2:

1. The buildings associated with these HVAC systems are not within the scope of license renewal and do not contain any in-scope SSCs. The sole function of each HVAC system is to provide climate control for its associated structure. These HVAC systems are not relied upon to perform any safety-related (SR) function or regulated event, and a failure in HVAC system components cannot prevent a SR function.
2. The “Miscellaneous Ventilation and Cooling Systems” includes HVAC components associated with the NSCW Chemical Control Building, RPF, and Electric Boiler Building.
3. The cathodic protection system functions to reduce corrosion rates of the condenser waterboxes. The condenser, and consequently the cathodic protection system are not in scope for license renewal.
4. The backup diesel generator for the outdoor lighting system performs no safety function, and its failure will not compromise any safety-related system nor prevent a safe shutdown of the plant. Outdoor lighting is not credited for safe shutdown (see VEGP UFSAR Section 9.5.3.2.3.B)
5. The Plumbing System directs Equipment Building roof drainage to the storm drains. The routing has been reviewed and determined to not pose a spatial interaction concern for safety-related SSCs.
6. These buildings and misc. storage pads are not relied upon to perform any safety-related (SR) function or regulated event, do not contain any in-scope SSCs, and a failure of the structure cannot prevent a SR function. The structures are seismic Category 2 structures. Seismic Category 1 structures are sufficiently isolated or protected from Category 2 structures to ensure their integrity is maintained at all times.
7. Structures are located outside of the protected area.
8. The potential hazard from onsite storage tanks has been evaluated – refer to VEGP UFSAR Section 2.2.3.1.4.3 and Table 2.2.3-18.

The electric steam boilers and all associated equipment located in the electric steam boiler building have been removed – refer to VEGP UFSAR Section 7.6.6.5.

2.3 SCOPING AND SCREENING RESULTS - MECHANICAL SYSTEMS

The determination of mechanical systems within the scope of license renewal is made by identifying VEGP system functions and determining which ones satisfy one or more criteria contained in 10 CFR 54.4. A description of this process is provided in Section 2.1, and the results of the mechanical system scoping review are contained in Section 2.2.

The mechanical system components subject to AMR are identified in the following sections:

- 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

VEGP-unique system identifying numbers are provided in parentheses beside the name of each system.

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM (1201)

The Reactor Vessel, Internals, and Reactor Coolant System are described in detail in the following sections:

- Reactor Vessel, Section 2.3.1.1
- Reactor Vessel Internals, Section 2.3.1.2
- Reactor Coolant System and Connected Lines, Section 2.3.1.3
- Pressurizer, Section 2.3.1.4
- Steam Generators, Section 2.3.1.5

The general description and scoping results are described below.

General Description

The reactor vessel, internals, and Reactor Coolant System (RCS) comprise the systems and components designed to contain and support the nuclear fuel, contain the reactor coolant, and transfer the heat produced in the reactor to the steam and power conversion systems for production of electricity.

The RCS is defined as the reactor vessel, including the reactor head and the control rod drive mechanism housing; reactor vessel internals; nuclear fuel, fixed incore flux thimble guide tubes, movable incore flux thimble tubes; the steam generators; the reactor coolant pumps; pressurizer; safety and relief valves; the reactor vessel head vent system; interconnecting piping; valves and fittings between the principle components listed above; and the piping, fittings, and valves leading to connecting auxiliary systems.

The reactor vessel, reactor vessel internals, reactor coolant system and connected lines, pressurizer, and steam generators are all included in system 1201, Reactor Coolant System. For license renewal purposes, the class 1 portions of the Safety Injection System and Chemical and Volume Control System (which form the interfaces between those systems and the RCS) are included in the reactor coolant system and connected lines.

Scope Determination Summary

The Reactor Vessel, Internals, and Reactor Coolant System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the following requirements:

- The reactor vessel, reactor coolant system and connected lines, pressurizer, and steam generators provide pressure boundary for the reactor coolant. This pressure boundary forms the second fission product barrier (after the fuel cladding).
- The reactor vessel supports the nuclear fuel bundles and reactor internals.
- The reactor vessel internals provide support for the reactor core and provide flow path control for the reactor coolant circulating through the reactor.
- The reactor vessel internals provide support, guidance and protection for the control rod assemblies.
- The reactor coolant system piping provides a flow path for the coolant to circulate from the reactor vessel to steam generators to provide for heat transfer of reactor core energy to the Main Steam System.
- The pressurizer provides a flowpath to the pressurizer power-operated relief valves and safety relief valves for hot and cold overpressure protection of the reactor vessel and other RCS components, and maintains the RCS pressure above saturation through use of heaters and cooling spray.
- The steam generators provide pressure boundary for main feedwater and main steam.
- The steam generators provide heat transfer from the RCS to the feedwater to provide core cooling.
- The steam generators provide support for the RCS piping.

The Reactor Vessel, Internals, and Reactor Coolant System is included in the scope of license renewal based on the criteria of 10 CFR 54.4(a)(2) due to the following:

- The system includes nonsafety-related piping, fittings, and valves that are attached to and provide support to safety-related piping.

Certain electrical components associated with the Reactor Vessel, Internals, and Reactor Coolant System are included on the EQ Master List. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

Components in the Reactor Vessel, Internals, and Reactor Coolant System are also included in the scope of license renewal based on the criteria of 10 CFR 54.4(a)(3) due to being evaluated in analyses for coping with the following events:

- The reactor vessel is credited with maintaining pressure boundary and supporting core cooling during safe shutdown following a fire, or station blackout. The vessel also supports the evaluation of pressurized thermal shock.
- The reactor vessel internals are credited to reduce the RPV fast neutron fluence, and therefore are relied upon for protection against pressurized thermal shock.
- The reactor coolant system and connected lines maintains its pressure boundary and provides core cooling during a safe shutdown following a fire, or station blackout.
- The pressurizer maintains its pressure boundary and supports core cooling during a safe shutdown following a fire, or station blackout.
- The steam generators provide pressure boundary and provide decay heat removal for the RCS for safe shutdown following a fire, or station blackout.

The following scoping criteria are met by system 1201, Reactor Vessel, Internals, and Reactor Coolant System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X		X

2.3.1.1 Reactor Vessel (1201-RPV)

System Description

The Reactor Vessel System boundary includes the reactor vessel itself, along with portions of associated systems that effectively constitute a part of the reactor coolant pressure boundary. These systems include the control rod drive mechanism pressure boundary components and pressure boundary components associated with instrumentation, both incore flux instrumentation and core cooling monitoring.

The reactor vessel is cylindrical, with a welded hemispherical bottom head and a hemispherical upper closure head. The vessel contains the core, core supporting structures, control rods, and other parts directly associated with the core. These reactor vessel internals are discussed in the next section. The upper closure head contains penetrations for control rod drive mechanisms (CRDMs), thermocouples, Reactor Vessel Level Instrumentation System (RVLIS) instruments, and a head vent. The vessel shell contains 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 contains penetrations for connection and entry of nuclear incore instrumentation. Conduits extend from the nuclear incore instrumentation penetrations down through the concrete shield area and up to a thimble seal table. The conduits and seal table mechanical seals provide the pressure barrier between the reactor coolant and the containment atmosphere.

VEGP UFSAR References

The reactor vessel is discussed in VEGP UFSAR Section 5.3, Reactor Vessel. The Core Cooling Monitoring System instrumentation is discussed in VEGP UFSAR Section 7.7.2.7, and the Reactor Vessel Level Instrumentation System is discussed in VEGP UFSAR Section 7.7.2.8.

License Renewal Drawings

1X4LD111 2X4LD111

Components Subject to an AMR

Table 2.3.1.1 Reactor Vessel Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Bottom Head Torus and Dome	Pressure Boundary
2	Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary
3	Bottom Mounted Instrumentation Penetrations	Pressure Boundary
4	Closure Head Dome, Torus and Flange	Pressure Boundary
5	Closure Head Lifting Lugs and Vent Shroud Support Lugs	Structural Support
6	Closure Studs, Nuts, and Washers	Pressure Boundary
7	Conoseal (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assemblies	Pressure Boundary
8	Conoseal (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assembly Fasteners	Pressure Boundary
9	Core Support Lugs and Pads	Structural Support
10	CRDM & Instrumentation Housing Penetrations	Pressure Boundary
11	CRDM Housing Adapters	Pressure Boundary
12	CRDM Latch Housings and Rod Travel Housings	Pressure Boundary
13	Head Vent Penetration	Pressure Boundary
14	Intermediate Shell Course	Pressure Boundary
15	Leakage Monitoring Tube Assembly	Pressure Boundary
16	Lower Shell Course	Pressure Boundary
17	Primary Inlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support
18	Primary Nozzle Dissimilar Metal Welds	Pressure Boundary
19	Primary Nozzle Safe Ends and Butt Ends	Pressure Boundary

Table 2.3.1.1 (Cont'd) Reactor Vessel Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
20	Primary Outlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support
21	Refueling Seal Ledge	Pressure Boundary Structural Support
22	Seal Table and Fittings	Pressure Boundary
23	Upper (nozzle) Shell Course	Pressure Boundary
24	Ventilation Shroud Support Ring	Structural Support
25	Vessel Flange	Pressure Boundary
26	Vessel Head Thermal Sleeves	Structural Support

2.3.1.2 Reactor Vessel Internals (1201-RVI)

System Description

The reactor internals consist of the lower core support structure, the upper core support structure, and the incore instrumentation support structures. The fuel assemblies and control rod drive assemblies are included in the reactor internals. The reactor internals support the 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 pressure vessel head, provide gamma and neutron shielding, and provide guides for the incore instrumentation.

The lower core support structure consists of the core barrel, the core baffle, the lower core plate and support columns, the neutron shield pads, and the core support, which is welded to the core barrel. The lower core support structure is supported at its upper flange from a ledge in the reactor vessel and, at its lower end, is restrained by a radial support system attached to the vessel wall. The upper core support structure consists of the upper support, the upper core plate, the support columns, and the guide tube assemblies. The incore instrumentation support structures consist of an upper system to convey and support thermocouples penetrating the vessel through the head, and a lower system to convey and support flux thimble tubes penetrating the vessel through the bottom.

VEGP UFSAR References

The reactor vessel internals are discussed in VEGP UFSAR Section 3.9.5, Reactor Pressure Vessel Internals.

License Renewal Drawings

There are no license renewal drawings for the reactor vessel internals.

Components Subject to an AMR

Table 2.3.1.2 lists the reactor vessel internals components and associated intended functions. The reactor vessel internals functions include structural support, flow distribution, and radiation shielding. The functions have been further defined to align with the functions shown in WCAP 14577-A Revision 1. The following are reactor vessel internals functions RVI-1 through RVI-6 used in Table 2.3.1.2.

RVI-1 – Structural Support (Provide support and orientation of the reactor core.)

RVI-2 – Structural Support (Provide support, orientation, guidance, and protection of the control rod assemblies.)

RVI-3 – Flow Distribution (Provide a passageway for the distribution of reactor coolant flow to the reactor core.)

RVI-4 – Structural Support (Provide a passageway for support, guidance, and protection for incore instrumentation.)

RVI-5 – Structural Support (Provide a secondary core support for limiting the core support structure downward displacement.)

RVI-6 – Radiation Shielding (Provide gamma and neutron shielding for the reactor vessel.)

Table 2.3.1.2 Reactor Vessel Internals Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Baffle and Former Plates	RVI-1, RVI-3, RVI-6
2	Baffle Bolts	RVI-1, RVI-3
3	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4
4	Bottom Mounted Instrumentation Column Cruciforms	RVI-4
5	Clevis Inserts and Fasteners	RVI-1
6	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2
7	Control Rod Guide Tube Support Pins	RVI-2
8	Core Barrel, Core Barrel Flange and Core Barrel Outlet Nozzles	RVI-1, RVI-3, RVI-6
9	Flux Thimble Tubes	RVI-4
10	Head / RPV Alignment Pins (with associated fasteners)	RVI-2

Table 2.3.1.2 (Cont'd) Reactor Vessel Internals Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
11	Head Cooling Spray Nozzles	RVI-3
12	Hold-down Spring	RVI-1
13	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1, RVI-3, RVI-4, RVI-5
14	Lower Support Column Assemblies (with associated fasteners)	RVI-1, RVI-4, RVI-5
15	Lower Support Forging	RVI-1, RVI-3, RVI-4, RVI-5
16	Neutron Shields (with associated fasteners)	RVI-6
17	Radial Support Keys	RVI-1
18	Secondary Core Support Assembly (with associated fasteners)	RVI-1, RVI-3, RVI-4, RVI-5
19	Upper Core Plate Alignment Pins	RVI-2
20	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1, RVI-3
21	Upper Instrumentation Conduit and Supports (with associated fasteners)	RVI-4
22	Upper Support Assembly (with associated fasteners)	RVI-2
23	Upper Support Column Assemblies (with associated fasteners)	RVI-2, RVI-4

2.3.1.3 Reactor Coolant System and Connected Lines (1201-RCS, 1204-RCS, 1208-RCS)

System Description

The VEGP Reactor Coolant System consists of four similar heat transfer loops connected in parallel to the reactor pressure vessel. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. In addition, the system includes a pressurizer, pressurizer relief and safety valves, the Reactor Vessel Head Vent System, interconnecting piping, Reactor Vessel Level Instrumentation System (RVLIS) instruments, and instrumentation necessary for operational control. The pressurizer and steam generators are addressed separately in the sections that follow. All the above components are located in the Containment Building.

During operation, the RCS transfers the heat generated in the core to the steam generators, where steam is produced to drive the turbine-generator. Borated demineralized water is circulated in the RCS at a flowrate and temperature consistent with achieving the reactor core thermal-hydraulic performance. The water also acts 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 against the release of radioactivity generated within the reactor and is designed to ensure a high degree of integrity throughout the life of the plant.

The RCS pressure is controlled by the use of the pressurizer where water and steam are maintained at saturation conditions by electrical heaters and water sprays. Steam can be formed (by the heaters) or condensed (by the pressurizer spray) to minimize pressure variations due to contraction and expansion of the reactor coolant. Spring-loaded safety valves and power-operated relief valves connected to the pressurizer provide for steam discharge from the RCS. Discharged steam is piped to the pressurizer relief tank (pressurizer relief discharge system), where the steam is condensed and cooled by mixing with quench water in the tank.

The RCS system boundary includes all of the ASME Class 1 piping components, the Reactor Coolant Pumps and ASME Class 1 branch piping connected to the RCS loops. Based on this convention, the VEGP RCS System boundary includes the ASME Class 1 portions of the Emergency Core Cooling System, and Chemical and Volume Control System. Non-ASME Class 1 piping components directly associated with the RCS boundary and the RCP Oil Collection System are also included in the system boundary.

RCS piping includes special components such as the pressurizer spray scoops, sample connection scoops, and RTD installation bosses and thermowells. For license renewal, these components are included in the component types “Piping Components - Class 1.”

Each of the four reactor coolant loops contains a vertically mounted, single stage, centrifugal Reactor Coolant Pump (RCP) that employs a controlled leakage seal assembly. The RCPs provide the motive force for circulating the reactor coolant through the reactor core, piping, and the steam generators.

VEGP UFSAR References

The Reactor Coolant System and Connected Lines are discussed in VEGP UFSAR Chapter 5.0, Reactor Coolant System and Connected Systems and the Reactor Vessel Level Instrumentation System is discussed in VEGP UFSAR Section 7.7.2.8.

License Renewal Drawings

1X4LD111	2X4LD111
1X4LD112	2X4LD112
1X4LD113	2X4LD113
1X4LD114	2X4LD114
1X4LD119	2X4LD119
1X4LD122	2X4LD122
1X4LD127	2X4LD127
1X4LD129	
1X4LD140-1	2X4LD140-1

Components Subject to an AMR

The Reactor Coolant System and Connected Lines components subject to an AMR are listed in the table that follows. The RCP seals are not listed in the table and are not subject to an aging management review for the following reasons:

- Seal function is active in nature. Rotating seal faces are a part of the RCP rotating assembly which is an active component.
- The RCP seal package and its constituent components are periodically overhauled. The seals are inspected and parts are replaced, as required.

Plant and industry operating experience with RCP seal performance has demonstrated the effectiveness of these activities. Seal leakoff is closely monitored in the Control Room, and abnormal seal flows are alarmed as conditions requiring evaluation and corrective actions.

Table 2.3.1.3 Reactor Coolant System and Connected Lines Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Capillary Tubing (sealed) for RVLIS Level Transmitters	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Closure Bolting, Class 1	Pressure Boundary
4	Flow Orifice/Elements	Flow Restriction Pressure Boundary
5	Oil Coolers - RCP Motors (Channel Heads)	Pressure Boundary
6	Oil Coolers - RCP Motors (Shells)	Pressure Boundary
7	Piping Components	Pressure Boundary
8	Piping Components - Class 1 < NPS 4	Pressure Boundary
9	Piping Components - Class 1 ≥ NPS 4	Pressure Boundary
10	Piping Components - Reactor Coolant Loop	Pressure Boundary
11	Pressurizer Relief Tank	Pressure Boundary
12	RCP Bolting Ring	Pressure Boundary
13	RCP Casing	Pressure Boundary
14	RCP Closure Bolting	Pressure Boundary
15	RCP Lube Oil Drain Tank	Pressure Boundary
16	RCP Lube Oil Drain Tank Flame Arrestor Element	Flame Arresting
17	RCP Lube Oil Drain Tank Flame Arrestor Housing	Pressure Boundary
18	RCP Lube Oil Drip Pans and Enclosure	Pressure Boundary
19	RCP Thermal Barrier Assembly	Pressure Boundary
20	Valve Bodies	Pressure Boundary
21	Valve Bodies - Class 1	Pressure Boundary

2.3.1.4 Pressurizer (1201-PZR)

System Description

RCS pressure is controlled by the pressurizer, where water and steam are maintained in equilibrium by electrical heaters and coolant sprays. Steam can be formed or condensed to minimize pressure variations caused by contraction or expansion of the reactor coolant. Spring-loaded safety valves and power-operated relief valves are connected to the pressurizer upper head.

The pressurizer is a vertical, cylindrical vessel with hemispherical top and bottom heads. Spray line nozzles and relief and safety valve connections are located in the top head of the pressurizer vessel. The pressurizer bottom nozzle is connected to a reactor coolant hot leg via the pressurizer surge line. Removable electric heaters are installed in the bottom head.

VEGP UFSAR References:

The pressurizer is discussed in VEGP UFSAR Section 5.4.10, Pressurizer.

License Renewal Drawings

1X4LD112	2X4LD112

Components Subject to an AMR

Table 2.3.1.4 Pressurizer Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting (Manway)	Pressure Boundary
2	Heater Sheaths	Pressure Boundary
3	Heater Well Penetrations	Pressure Boundary
4	Instrument Penetrations	Pressure Boundary
5	Manway and Cover	Pressure Boundary
6	Nozzle Dissimilar Metal Welds	Pressure Boundary
7	Nozzles – Safe Ends	Pressure Boundary
8	Nozzles – Safety & Relief Nozzles	Pressure Boundary
9	Nozzles – Spray Nozzles	Pressure Boundary
10	Nozzles – Surge Nozzles	Pressure Boundary
11	Shells, Upper Head, and Lower Head	Pressure Boundary
12	Support Lugs (Seismic Lugs)	Structural Support
13	Support Skirt and Flange	Structural Support
14	Thermal Sleeves (Surge and Spray Nozzles)	Structural Support

2.3.1.5 Steam Generators (1201-SG)

System Description

Four steam generators are installed in each unit; one in each reactor coolant loop.

All steam generators are Westinghouse Model F, vertical U-tube steam generators with integral moisture separating equipment. On the primary side, reactor coolant flows through the inverted U-tubes, entering and leaving through the nozzles located in the hemispherical bottom head of the steam generator. The head is divided into inlet and outlet chambers by a vertical partition plate extending from the head to the tube sheet.

On the secondary side, feedwater flows directly into the annulus formed by the outer shell and tube bundle wrapper before entering the boiler section of the steam generator. The water and steam mixture then flows upward through the tube bundle and into the steam drum section. A set of centrifugal moisture separators, located above the tube bundle, remove most of the entrained moisture in the steam. Steam dryers are employed to further increase the steam quality.

VEGP UFSAR References

The steam generators are discussed in VEGP UFSAR Section 5.4.2, Steam Generators.

License Renewal Drawings

1X4LD111	2X4LD111

Components Subject to an AMR

Table 2.3.1.5 Steam Generator Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Anti-Vibration Bars	Structural Support
2	Auxiliary Feedwater Nozzle	Pressure Boundary
3	Auxiliary Feedwater Nozzle Thermal Sleeve	Structural Support Flow Direction
4	Auxiliary Feedwater Spray Piping	Structural Support Flow Direction
5	Closure Bolting (Primary)	Pressure Boundary
6	Closure Bolting (Secondary)	Pressure Boundary
7	Feedwater Distribution Assembly Piping, Fittings & Supports	Flow Distribution Physical Integrity
8	Feedwater Inlet Nozzle	Pressure Boundary
9	Feedwater Inlet Nozzle Thermal Sleeve	Structural Support Flow Distribution
10	Feedwater J-Tubes	Structural Support Flow Direction
11	Moisture Separator Assembly - Primary	Structural Support
12	Moisture Separator Assembly - Secondary	Structural Support
13	Primary Channel Head (with Integral Primary Nozzles & Manways)	Pressure Boundary
14	Primary Channel Head Divider Plate	Pressure Boundary
15	Primary Channel Head Drain Connection Coupling	Pressure Boundary
16	Primary Channel Head Drain Connection Tube & Dissimilar Metal Weld	Pressure Boundary

Table 2.3.1.5, (Cont'd) Steam Generator Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
17	Primary Inlet and Outlet Nozzle Safe Ends (stainless steel weld buildup)	Pressure Boundary
18	Primary Inlet and Outlet Nozzle Weld Cap (Inconel weld overlay)	Structural Support
19	Primary Manway Covers and Disc Inserts	Pressure Boundary
20	Secondary Side Manways, Handholes, and Covers	Pressure Boundary
21	Secondary Side Shell Penetrations (Blowdown, Drain, Water Level, Sampling, Layup)	Pressure Boundary
22	Stayrod Assemblies	Structural Support
23	Steam Outlet Flow Limiter	Flow Restriction
24	Steam Outlet Nozzle	Pressure Boundary
25	Trunnions - Upper and Lower	Pressure Boundary
26	Tube Bundle Wrapper and Support Assy	Structural Support Flow Direction
27	Tube Plugs	Pressure Boundary
28	Tube Support Plates, Flow Distribution Baffles	Structural Support Flow Direction
29	Tubeplate	Pressure Boundary
30	Tubes (U-Tubes)	Pressure Boundary Exchange Heat
31	Upper Head	Pressure Boundary
32	Upper Shells, Lower Shells, and Transition Cones	Pressure Boundary

2.3.2 ENGINEERED SAFETY FEATURES

VEGP UFSAR Section 6.0 defines the Engineered Safety Features systems as the Containment Building, Containment Spray System, Containment Fan Cooler System (which is known as the Containment Building Air Cooling System), Containment Isolation System, Combustible Gas Control System (which is known as the Hydrogen Recombiners And Hydrogen Monitoring System), Emergency Core Cooling System, Habitability Systems (Control Room HVAC), ESF Filter Systems (for the Fuel Handling Building Post-Accident Exhaust, the Piping Penetration Filter Exhaust System, and the Control Room HVAC System), and the Auxiliary Feedwater System. NUREG-1801, Volume 2, Chapter V, Engineered Safety Features, lists the Containment Spray System, Containment Isolation Components, and Emergency Core Cooling System as the ESF systems for a PWR.

In order to maintain alignment with the NUREG-1801 format, this application describes the following ESF Systems in this section:

- Containment Spray System, Section 2.3.2.1
- Emergency Core Cooling System, Section 2.3.2.2
- Containment Isolation System, Section 2.3.2.3

The VEGP Safety Injection System, the high head safety injection portion of the Chemical and Volume Control System (CVCS), and the RHR System (which provides low head safety injection) together form the Emergency Core Cooling System.

The remaining ESF systems listed in UFSAR Section 6.0 are described in the the following sections of the application:

- Containment Building, Section 2.4.1
- Containment Building Air Cooling System, in Section 2.3.3.13
- Hydrogen Recombiner and Monitoring System, Section 2.3.3.22
- Control Room Area HVAC System, in Section 2.3.3.11
- Fuel Handling Building Post-Accident Exhaust System, in Section 2.3.3.14
- Piping Penetration Filter Exhaust System, in Section 2.3.3.12
- Auxiliary Feedwater System, Section 2.3.4.4.

2.3.2.1 Containment Spray System (1206)

System Description

The function of the Containment Spray (CS) System is to provide borated water for removing decay heat and iodine from the containment atmosphere in post accident conditions. The CS System consists of two trains, each containing a pump, spray ring header and spray nozzles, valves and connecting piping. Baskets with trisodium phosphate are located on the containment floor for mixing with the recirculating borated water for post-accident sump pH control. Containment emergency sumps are located in containment for collection of borated water to provide suction to the CS pumps for recirculation after initial injection.

Water from the refueling water storage tank (RWST) provides suction to the containment spray pumps for initial injection. At the latter stages of the injection phase, operators initiate a manual switch over to recirculation in which the CS pumps take suction from the containment emergency sumps. Each sump is provided with a suction strainer to prevent debris from entering the CS System. The Containment Spray System is designed to operate over an extended period of time and under environmental conditions existing following a Reactor Coolant System failure.

The containment sumps, suction strainers and trisodium phosphate baskets are addressed in the Structural scoping for the Containment Internal Structures, Section 2.4.1. The RWST is addressed in Section 2.3.2.2 and in the Structural scoping for the Concrete Tank and Valve House Structures, Section 2.4.7.

Scope Determination Summary

The Containment Spray System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to reduce post-accident iodine and particulate fission product concentration in the Containment Building atmosphere as necessary to limit offsite dose, and to remove heat from the containment atmosphere following a LOCA or main steam line break accident to maintain the containment pressure below design values to maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Containment Spray System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References for the Containment Spray System

The Containment Spray System is discussed in VEGP UFSAR Section 6.2, Containment Systems.

The Containment Emergency Core Cooling System (ECCS) sump suction screens (included with Civil LRA system Containment Internal Structures), are discussed in VEGP UFSAR Section 6.2.2.2.2.3.6.

The trisodium phosphate baskets used for containment sump pH control are included with Civil LRA system Containment Internal Structures, and are discussed in VEGP UFSAR Section 6.2.2.2.2, System Design.

License Renewal Drawings

1X4LD131
1X4LD134
2X4LD131
2X4LD134

Components Subject to an AMR

Table 2.3.2.1 Containment Spray System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Capillary Tubing (sealed) for CTMT Pressure Sensors	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Eductors - CTMT Spray	Pressure Boundary
4	Encapsulation Vessels	Pressure Boundary
5	Flow Orifice / Elements	Pressure Boundary
6	Motor Coolers - CTMT Spray Pumps (Channel Heads)	Pressure Boundary
7	Motor Coolers - CTMT Spray Pumps (Shells)	Pressure Boundary
8	Motor Coolers - CTMT Spray Pumps (Tubes)	Exchange Heat Pressure Boundary
9	Motor Coolers - CTMT Spray Pumps (Tubesheets)	Pressure Boundary
10	Piping Components	Pressure Boundary
11	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary
12	Pump Casings - CTMT Spray Pumps	Pressure Boundary
13	Spray Nozzles	Flow Distribution
14	Tank - Spray Additive Tank (Unit 2 only)	Structural Support
15	Valve Bodies	Pressure Boundary

2.3.2.2 Emergency Core Cooling Systems

The Emergency Core Cooling Systems include the following VEGP Systems:

- Safety Injection System (non-Class 1 portion) (1204-ECCS)
- Safety Injection portion of the CVCS System (1208-ECCS)
- Residual Heat Removal System (1205)

General Description

The primary function of the ECCS following an accident is to remove the stored and fission product decay heat from the reactor core. The ECCS at VEGP consists of passive injection by the safety injection accumulators (SI), high head active injection by the centrifugal charging pumps (CVCS) and safety injection pumps (SI) and low head injection by the residual heat removal pumps (RHR). Long term recirculation and cooling of ECCS is provided by the RHR pumps and heat exchangers.

The Refueling Water Storage Tank (RWST) serves as a source of emergency borated cooling water for the High Head Safety Injection, Low Head Safety Injection, and Containment Spray during the injection mode. The RWST is designed to hold enough dilute boric acid solution to fill the refueling canal prior to refueling operations, and to provide injection water to support the Safety Injection System. The RWST can also be used to fill the refueling cavity via the refueling water purification pump.

Safety Injection System (including portions of CVCS)

System Description

The Safety Injection (SI) System consists of two safety injection pumps, four accumulators and associated piping and valves. The SI provides post-accident, high head and portions of low head safety injection for emergency core cooling to limit core damage and fission product release and to ensure adequate shutdown margin. SI includes passive injection of coolant via the safety injection accumulators.

The Refueling Water Storage tanks are constructed of concrete with a stainless steel liner. The tank liner is evaluated in this section as a mechanical component. The concrete shell, roof, and base slab are evaluated in the Structural scoping for the Concrete Tank and Valve House Structures, Section 2.4.7.

The Refueling Water Storage Tank (RWST) is the suction source for the safety injection pumps which pump borated water into the RCS in the injection phase. Switchover from the injection phase to the recirculation phase is accomplished when the RWST reaches a low level. In the recirculation phase, the system provides continuous long-term, post-accident cooling of the core by taking suction from the containment sumps.

For license renewal, the Safety Injection System is scoped to include those portions of the CVCS whose primary function is to support safety injection. This includes the centrifugal charging pump suction line from the RWST and the centrifugal charging pumps which supply high head safety injection. The CVCS is addressed in Section 2.3.3.10.

The Safety Injection System interfaces the RHR system and the RCS. The primary interfaces with the RHR System are downstream of the RHR heat exchangers. The primary interface with the RCS is in the hot and cold leg injection lines for each of the 4 RCS loops.

Scope Determination Summary

The Safety Injection System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to provide reactivity control, provide short-term core cooling via coolant injection, provide long-term core and Containment Building cooling by cooling and recirculating water from the containment sumps, and to maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, is required to provide a minimum flowpath for the Centrifugal Charging Pumps or Safety Injection Pumps, or to prevent failures of piping internal to the RWST from interfering with the ECCS suction piping, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. Portions of the system are listed on the Fire Event Safe Shutdown Systems/Components table. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Safety Injection System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

Residual Heat Removal System

System Description

The Residual Heat Removal (RHR) System consists of two trains of one pump, one heat exchanger and associated piping and valves. RHR transfers heat from the RCS to the Nuclear Service Cooling Water System via the Component Cooling Water System to reduce the temperature of the reactor coolant to the cold shutdown temperature at a controlled rate during the second part of normal plant cooldown, and maintains this temperature until the plant is started up again. During RCS low temperature operation, the RHR System relief valves in the RHR pump suction lines mitigate RCS overpressure transients.

Portions of the RHR System also serve as parts of the Emergency Core Cooling System for accident mitigation. Following a LOCA RHR is initially aligned to take suction from the RWST and inject into the RCS in the event RCS pressure is low enough for low head safety injection. When the ECCS switches from the injection phase to the recirculation phase, the RHR pumps take suction from the containment emergency sumps and recirculate sump borated water to the RCS at low pressure or provides suction to the safety injection pumps and charging pumps for high head recirculation.

Each containment emergency sump is provided with a strainer to prevent debris from entering the ECCS. The containment emergency sumps and sump strainers are addressed in civil/structural scoping in Section 2.4.1 of this application.

Scope Determination Summary

The Residual Heat Removal System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to provide reactivity control, provide short-term core cooling via coolant injection, provide long-term core and Containment Building cooling by cooling and recirculating water from the containment sumps, and to maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. Portions of the system are evaluated in analyses for fire event safe shutdown. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Residual Heat Removal System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

VEGP UFSAR References for ECCS

The Residual Heat Removal System is described in VEGP UFSAR Section 5.2.2.10, RCS Pressure Control During Low Temperature Operation, VEGP UFSAR Section 5.4.7, Residual Heat Removal System, and VEGP UFSAR Section 6.3, Emergency Core Cooling System.

The Safety Injection System is described in VEGP UFSAR Section 6.3, Emergency Core Cooling System.

The RWST is described in VEGP UFSAR Section 6.2.2, Containment Heat Removal Systems, and VEGP UFSAR Section 6.3, Emergency Core Cooling System.

License Renewal Drawings for ECCS

1X4LD115	2X4LD115
1X4LD116-1	2X4LD116-1
1X4LD116-2	2X4LD116-2
1X4LD119	2X4LD119
1X4LD120	2X4LD120
1X4LD121	2X4LD121
1X4LD122	2X4LD122
AX4LD123-2	
1X4LD130	2X4LD130
1X4LD131	2X4LD131
1X4LD134	2X4LD134
1X4LD137	2X4LD137
1X4LD140-1	2X4LD140-1

Components Subject to an AMR

Table 2.3.2.2 Emergency Core Cooling Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Eductors - RWST Mixing	Structural Support
3	Electric Heater Housings	Pressure Boundary
4	Encapsulation Vessels	Pressure Boundary
5	Filter Housings	Pressure Boundary
6	Flexible Connectors	Pressure Boundary
7	Flow Orifice / Elements	Pressure Boundary Flow Restriction
8	Heat Exchangers - RHR HXs (Channel Heads)	Pressure Boundary
9	Heat Exchangers - RHR HXs (Shells)	Pressure Boundary
10	Heat Exchangers - RHR HXs (Tubes)	Pressure Boundary Exchange Heat
11	Heat Exchangers - RHR HXs (Tubesheets)	Pressure Boundary
12	Motor Coolers - Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary
13	Motor Coolers - Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Shells)	Pressure Boundary
14	Motor Coolers - Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat
15	Motor Coolers - Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubesheets)	Pressure Boundary
16	Motor Coolers - RHR Pumps (Shells)	Pressure Boundary
17	Oil Coolers - Centrifugal Charging Pumps, SI Pumps (Channel Heads)	Pressure Boundary

Table 2.3.2.2, (Cont'd) Emergency Core Cooling System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
18	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Shells)	Pressure Boundary
19	Oil Coolers - Centrifugal Charging Pumps, SI Pumps (Tubes)	Exchange Heat Pressure Boundary
20	Oil Coolers - Centrifugal Charging Pumps, SI Pumps (Tubesheets)	Pressure Boundary
21	Oil Reservoirs - CCPs & SI Pumps Lube Oil	Pressure Boundary
22	Piping Components	Pressure Boundary
23	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary
24	Pump Casings - Centrifugal Charging Pumps, RHR Pumps, Safety Injection Pumps	Pressure Boundary
25	Pump Casings - Lube Oil Pumps	Pressure Boundary
26	Pump Casings - Sludge Mixing Pumps	Pressure Boundary
27	Seal Water Coolers - RHR Pumps (Covers)	Pressure Boundary
28	Seal Water Coolers - RHR Pumps (Shells)	Pressure Boundary
29	Seal Water Coolers - RHR Pumps (Tubes)	Pressure Boundary Exchange Heat
30	Sight Glasses	Pressure Boundary
31	Tank - Boron Injection Tank (Unit 1 only)	Pressure Boundary
32	Tank Liners (& internals) - RWST Liners	Pressure Boundary
33	Tanks - SI Accumulator Tanks	Pressure Boundary
34	Valve Bodies	Pressure Boundary

2.3.2.3 Containment Isolation System (2415)

System Description

The Containment Isolation System is an engineered safety feature that allows appropriate process fluids to pass through the containment boundary during normal and accident conditions, while providing for isolation of containment barrier penetrations as required to preserve the integrity of the containment barrier during accident conditions. Containment barrier penetrations are isolated as required to prevent uncontrolled or unmonitored leakage of radioactive materials to the environment. The Containment Isolation System is not a completely independent system. Each piping system which penetrates the containment is provided with containment isolation features which serve to minimize the release of fission products following a DBA. These features are scoped and evaluated in their respective mechanical process systems, rather than the Containment Isolation System.

Scope Determination Summary

These features are in-scope for license renewal, however they are scoped and evaluated as part of their respective mechanical process systems, rather than with the Containment Isolation System.

The civil/structural scoping for the Containment Building (Section 2.4.1) evaluates the containment isolation features associated with the structure. These civil/structural features include the sleeve assemblies surrounding process and electrical penetrations, and the miscellaneous/spare mechanical penetrations that are not associated with a process system. The conductor portions (e.g. electrical cables and connections) of electrical penetrations are included in the electrical/I&C screening described in Section 2.5 of this application.

2.3.3 AUXILIARY SYSTEMS

The Auxiliary Systems are described in the following sections:

- Fuel Storage Racks – New And Spent Fuel, Section 2.3.3.1
- Spent Fuel Cooling and Purification System, Section 2.3.3.2
- Overhead Heavy and Refueling Load Handling System, Section 2.3.3.3
- Nuclear Service Cooling Water Systems, Section 2.3.3.4
- Component Cooling Water System, Section 2.3.3.5
- Auxiliary Component Cooling Water System, Section 2.3.3.6
- Turbine Plant Cooling Water System, Section 2.3.3.7
- River Intake Structure System, Section 2.3.3.8
- Compressed Air System, Section 2.3.3.9
- Chemical and Volume Control and Boron Recycle Systems, Section 2.3.3.10
- Ventilation Systems – Control Building, Section 2.3.3.11
- Ventilation Systems – Auxiliary Building, Section 2.3.3.12
- Ventilation Systems – Containment Building, Section 2.3.3.13
- Ventilation Systems – Fuel Handling Building, Section 2.3.3.14
- Ventilation Systems – Diesel Generator Building, Section 2.3.3.15
- Ventilation Systems – Auxiliary Feedwater Pumphouse, Section 2.3.3.16
- Ventilation Systems – Miscellaneous, Section 2.3.3.17
- Ventilation Systems – Radwaste Buildings, Section 2.3.3.18
- Fire Protection Systems, Section 2.3.3.19
- Emergency Diesel Generator System, Section 2.3.3.20
- Demineralized Water System, Section 2.3.3.21
- Hydrogen Recombiner and Monitoring System, Section 2.3.3.22
- Drain Systems, Section 2.3.3.23
- Potable and Utility Water Systems, Section 2.3.3.24
- Radiation Monitoring System, Section 2.3.3.25
- Reactor Makeup Water Storage System, Section 2.3.3.26
- Sampling Systems, Section 2.3.3.27
- Auxiliary Gas Systems, Section 2.3.3.28
- Chilled Water Systems, Section 2.3.3.29
- Waste Management Systems, Section 2.3.3.30
- Thermal Insulation, Section 2.3.3.31
- Miscellaneous Leak Detection System, Section 2.3.3.32

2.3.3.1 Fuel Storage Racks – New and Spent Fuel (2201, 2202)

System Description

The New Fuel Storage Area and the Spent Fuel Pool are housed in the Fuel Handling Building, described in Section 2.4.2.

The New Fuel Storage Area houses new fuel storage racks for temporary dry storage of the new fuel assemblies. Each rack is composed of individual vertical cells which can be fastened together in any number to form a module that can be firmly bolted to anchors in the floor of the new fuel storage area. The new fuel storage racks are designed to include storage for 162 fuel assemblies at a center-to-center spacing of 21 inches. This spacing provides a minimum separation between adjacent fuel assemblies of 12 inches, which is sufficient to maintain a subcritical array even in the event the building is flooded with unborated water or during any design basis event.

Spent fuel is stored in high density racks. Each rack in the Unit 1 Spent Fuel Pool consists of several cells welded together to form the rack top grid. The cells are welded at the bottom to a supporting grid structure. The Unit 2 Spent Fuel Pool consists of an assemblage of cells interconnected to each other along their contiguous corners to produce a honeycomb cellular structure. All of these modules are free-standing, neither anchored to the floor nor braced to the wall. The design of the racks in conjunction with the soluble boron in the fuel storage pool is relied upon to maintain the stored fuel subcritical for all analyzed events as described in the UFSAR. There are storage locations for 1476 assemblies in the Unit 1 pool and 2098 assemblies in the Unit 2 pool.

Scope Determination Summary

The New and Spent Fuel Storage Racks are within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirement to store nuclear fuel in such a manner as to maintain a subcritical array under all postulated normal and accident conditions. The presence of Boral panels in the Unit 1 spent fuel racks is credited in the Unit 1 criticality analyses. The presence of any Boraflex panels in the Unit 2 spent fuel racks is ignored in the Unit 2 criticality analyses.

The following 10 CFR 54.4 criteria are met by the Fuel Storage Racks - New and Spent Fuel						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X						

VEGP UFSAR References

The New and Spent Fuel Storage Racks are discussed in VEGP UFSAR Section 9.1, Fuel Storage and Handling. The fuel storage criticality analyses are described in VEGP UFSAR Section 4.3.2.6.1.

License Renewal Drawings

None

Components Subject to an AMR

Table 2.3.3.1 Fuel Storage Racks – New and Spent Fuel Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Failed Fuel Rod Storage Basket	Structural Support
2	New Fuel Storage Rack Assembly	Reactivity Control Structural Support
3	Spent Fuel Storage Racks	Reactivity Control Structural Support

2.3.3.2 Spent Fuel Cooling and Purification System (1213)

System Description

The Spent Fuel Cooling and Purification System removes decay heat generated by spent fuel assemblies stored in the spent fuel pool and can be used to maintain clarity and purity of the water in the spent fuel pool, the fuel transfer canal, refueling cavity, and the RWST.

The Spent Fuel Cooling and Purification System consists of two cooling trains. Each cooling train incorporates one heat exchanger and pump and associated piping and valves. One purification loop, with demineralizer and filter and associated piping, valving, and instrumentation, services both cooling loops. One surface skimmer loop is also provided. Each cooling train is designed to maintain the spent fuel pool within the temperatures and heat loads described in the UFSAR.

Scope Determination Summary

The Spent Fuel Cooling and Purification System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to remove decay heat from the spent fuel pool and to maintain containment integrity.

Structural failure of the spent fuel pit strainers in the spent fuel pit could clog the safety-related spent fuel pumps and prevent them from delivering adequate flow for cooling the spent fuel pool. Therefore, the strainers are included in the scope of license renewal based on the 10 CFR 54.4 (a)(2) criterion. Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Spent Fuel Cooling and Purification System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Spent Fuel Cooling and Cleanup System is discussed in VEGP UFSAR Section 9.1.3, Spent Fuel Pool Cooling and Purification System.

License Renewal Drawings

1X4LD121	2X4LD121
AX4LD123-1	
1X4LD130	2X4LD130

Components Subject to an AMR

Table 2.3.3.2 Spent Fuel Cooling and Purification System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Demineralizer Vessels	Pressure Boundary
3	Flow Orifice / Elements	Pressure Boundary
4	Heat Exchangers – SFP HXs (Channel Heads)	Pressure Boundary
5	Heat Exchangers - SFP HXs (Shells)	Pressure Boundary
6	Heat Exchangers - SFP HXs (Tubes)	Exchange Heat Pressure Boundary
7	Heat Exchangers - SFP HXs (Tubesheets)	Pressure Boundary
8	Piping Components	Pressure Boundary
9	Piping Components - Piping Spools for Startup Strainers	Pressure Boundary

Table 2.3.3.2 (Cont'd) Spent Fuel Cooling and Purification System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
10	Pump Casings – Refuel Wtr Purification Pumps	Pressure Boundary
11	Pump Casings – SFP Pumps	Pressure Boundary
12	Pump Casings – SFP Skimmer Pumps	Pressure Boundary
13	Strainer Elements	Debris Protection
14	Strainer Housings	Pressure Boundary
15	Valve Bodies	Pressure Boundary

2.3.3.3 Overhead Heavy and Refueling Load Handling System

The Overhead Heavy and Refueling Load Handling System includes the following:

- Containment Building (Reactor) Polar Bridge Crane (1019)
- Spent Fuel Cask Bridge Crane (1020)
- Fuel Handling and RV Servicing Equipment (2203)

Containment Building (Reactor) Polar Bridge Crane

System Description

The Containment Building (Reactor) Polar Bridge Crane is a steel double box girder, electric, overhead, top running, motorized bridge crane with a 134-foot span. The crane is mounted on a circular runway rail that is supported by the Containment Building superstructure. The bridge consists of two asymmetrical, welded plate box girders with full-depth diaphragms, held together by structural end tie girders. The primary function of the polar crane is to provide hoisting capacity as required for the reactor head and internals during refueling and servicing operations. The crane's rated operational load capacity is based on the heaviest lift requirement for refueling, which is the integrated reactor head.

Scope Determination Summary

The Containment Building (Reactor) Polar Bridge Crane is within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion due to the requirements to maintain structural integrity and prevent dropping its base load during an SSE.

The following 10 CFR 54.4 criteria are met by the Containment Building (Reactor) Polar Bridge Crane:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Spent Fuel Cask Bridge Crane

System Description

The primary function of the Spent Fuel Cask Bridge Crane is to transport spent fuel casks between the railcar loading and unloading area and the spent fuel storage area. The crane may be used during normal plant operation or when the plant is shut down for refueling or maintenance. The crane is also used to unpack new fuel and transport it to the new fuel pit and to provide construction and maintenance lifts as required in the Fuel Handling Building and Auxiliary Building.

Scope Determination Summary

The Spent Fuel Cask Bridge Crane is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion due to the requirement to prevent a spent fuel cask drop.

The following 10 CFR 54.4 criteria are met by the Spent Fuel Cask Bridge Crane:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X						

Fuel Handling and RV Servicing Equipment

System Description

Fuel Handling and Reactor Vessel (RV) Servicing Equipment is used during core alterations (fuel shuffle and fuel movement, core unload and reload) and is designed to protect against fuel damage during handling and transfer operations. Fuel Handling and RV Servicing Equipment includes the Refueling Machine inside the Containment Building and the Fuel Handling Machine Bridge Crane in the Fuel Handling Building.

Scope Determination Summary

Fuel Handling and RV Servicing Equipment is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion due to the requirement to prevent a fuel handling accident.

Fuel Handling and RV Servicing Equipment is within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion due to the requirement to maintain structural integrity and prevent damage to safety-related components.

The following 10 CFR 54.4 criteria are met by the Fuel Handling and RV Servicing Equipment:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The Containment Building Polar Bridge Crane and Spent Fuel Cask Bridge Crane are discussed in VEGP UFSAR Section 9.1.5, Overhead Heavy Load Handling Systems.

The Fuel Handling and RV Servicing Equipment is discussed in VEGP UFSAR Section 9.1.4, Light Load Handling System (Related to Refueling).

License Renewal Drawings

There are no license renewal drawings for the Overhead Heavy and Refueling Load Handling System.

Components Subject to an AMR

Table 2.3.3.3 Overhead Heavy and Refueling Load Handling System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Baseplates and anchors for attachment to structures, and retaining clips	Structural Support
2	Crane (including bridge & trolley) Structural Girders	Structural Support
3	Crane Rails	Structural Support

2.3.3.4 Nuclear Service Cooling Water Systems (NSCW)

The NSCW Systems include the following VEGP systems:

- Nuclear Service Cooling Water (NSCW) System (1202)
- Nuclear Service Cooling Water Chemical Injection System (1413)

<u>Nuclear Service Cooling Water System</u>

System Description

The Nuclear Service Cooling Water (NSCW) System, composed of two redundant, completely independent, full capacity flow trains, provides essential cooling to safety-related equipment and to some nonsafety-related auxiliary components. Each train includes three 50 percent capacity vertical centrifugal pumps, one forced draft cooling tower and associated piping and valves. The system supplies cooling water for the containment coolers, Control Building essential chiller condensers, various engineered safety features (ESF) pump coolers, standby diesel generator jacket water coolers and the component cooling water (CCW) and auxiliary component cooling water (ACCW) heat exchangers.

The nuclear service cooling towers are the ultimate heat sink for the plant and are required for safe plant shutdown. They remove heat from the NSCW System during normal operation, safe shutdown and cooldown of the reactor, or accident conditions. Each cooling tower consists of a basin which contains the ultimate heat sink water and an upper structure in which the NSCW heat loads are transferred to the atmosphere. The upper structure is a vertical, circular, concrete mechanical draft tower with motor driven fans for heat rejection to the atmosphere by direct contact of water droplets from spray manifolds with forced air flow. The combined storage capacity of the two tower basins per unit meets the short-term storage requirements for the ultimate heat sink without makeup (30 days). The mechanical portion of the NSCW cooling towers includes the piping, valves and mechanical draft fans.

Scope Determination Summary

The NSCW System is required for safe plant shutdown, and is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related portions of the system are either connected to (and provides support to) safety-related piping and equipment, or could interact spatially with safety-related equipment; therefore the system also meets the 10 CFR 54.4(a)(2) criterion.

Equipment associated with the system is listed on the EQ master list, therefore the NSCW System meets the 10 CFR 54.4(a)(3) EQ criterion. NSCW equipment is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Nuclear Service Cooling Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

Nuclear Service Cooling Water Chemical Injection System

System Description

The Nuclear Service Cooling Water (NSCW) Chemical Injection System provides injections of biocide, dispersant, and corrosion inhibitor solutions to the NSCW System to inhibit biological growth, prevent suspended solids deposition, and reduce copper tube corrosion. This system is comprised of chemical injection pumps, chemical mixing and storage tanks and/or drums, and piping components for transferring chemical solutions to the injection points. The injection points are downstream of the NSCW pumps and at the NSCW cooling tower basins. The chemical injection equipment is located in the NSCW Chemical Control Building.

Scope Determination Summary

This NSCW Chemical Injection System is within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion due to the potential for spatial interaction with safety-related components.

The following 10 CFR 54.4 criteria are met by the Nuclear Service Cooling Water Chemical Injection System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Nuclear Service Cooling Water and Nuclear Service Cooling Water Chemical Injection Systems are discussed in VEGP UFSAR Section 9.2.1, Nuclear Service Cooling Water System.

License Renewal Drawings

1X4LD133-1
1X4LD133-2
1X4LD134
1X4LD135-1
1X4LD135-2
1X4LD170-1
1X4LD170-2
1X4LD174-6
1X4LD192-2

2X4LD133-1
2X4LD133-2
2X4LD134
2X4LD135-1
2X4LD135-2
2X4LD170-1
2X4LD170-2
2X4LD174-6
2X4LD192-2
2X4LD212

Components Subject to an AMR

Table 2.3.3.4 Nuclear Service Cooling Water Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat
4	Piping Components	Pressure Boundary
5	Pump Casings - NSCW System Pumps	Pressure Boundary
6	Pump Casings - NSCW Transfer Pumps	Pressure Boundary
7	Spray Nozzles	Flow Distribution
8	Valve Bodies	Pressure Boundary

2.3.3.5 Component Cooling Water System (1203)

System Description

The Component Cooling Water (CCW) System is a closed-loop system that acts as an intermediate heat transfer system between potentially radioactive heat sources and the Nuclear Service Cooling Water System to reduce the probability of radioactive releases to the environment resulting from a leaking component. The CCW System cools the spent fuel pool heat exchangers, the residual heat removal heat exchangers, and also provides cooling to the RHR pump seal coolers.

The CCW System consists of two redundant trains each containing one heat exchanger, three 50-percent centrifugal pumps, one surge tank and associated piping and valves. The CCW System is designed to operate at lower pressure than the NSCW System to prevent potentially contaminated CCW water from entering the NSCW System which is open to atmosphere through the NSCW Cooling Towers.

Scope Determination Summary

The CCW System provides cooling for equipment required for safe plant shutdown, and is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related portions of the system are either connected to (and provide support to) safety-related piping and equipment, or could interact spatially with safety-related equipment; therefore the system also meets the 10 CFR 54.4(a)(2) criterion.

CCW equipment is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Component Cooling Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

VEGP UFSAR References

The Component Cooling Water System is discussed in VEGP UFSAR Section 9.2.2, Component Cooling Water System.

License Renewal Drawings

1X4LD133-1	2X4LD133-1
1X4LD133-2	2X4LD133-2
1X4LD134	2X4LD134
1X4LD136	2X4LD136
1X4LD137	2X4LD137

Components Subject to an AMR

Table 2.3.3.5 Component Cooling Water System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Heat Exchangers - CCW HXs (Channel Heads)	Pressure Boundary
4	Heat Exchangers - CCW HXs (Shells)	Pressure Boundary
5	Heat Exchangers - CCW HXs (Tubes)	Exchange Heat Pressure Boundary
6	Heat Exchangers - CCW HXs (Tubesheets)	Pressure Boundary
7	Motor Coolers - CCW Pumps (Channel Heads)	Pressure Boundary
8	Motor Coolers - CCW Pumps (Shells)	Pressure Boundary
9	Motor Coolers - CCW Pumps (Tubes)	Exchange Heat Pressure Boundary
10	Motor Coolers - CCW Pumps (Tubesheets)	Pressure Boundary
11	Piping Components	Pressure Boundary
12	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
13	Pump Casings - CCW Pumps	Pressure Boundary
14	Tanks - CCW Chem Add Feeder Tanks	Pressure Boundary
15	Tanks - CCW Surge Tanks	Pressure Boundary
16	Valve Bodies	Pressure Boundary

2.3.3.6 Auxiliary Component Cooling Water System (1217)

System Description

The Auxiliary Component Cooling Water (ACCW) System removes heat from the heat exchangers and components that handle radioactive fluids which are necessary for normal plant startup, normal power operation, normal shutdown and cooldown of the plant, and refueling. The ACCW System is not essential for safe plant shutdown under accident conditions. The ACCW System is composed of two 100% capacity ACCW heat exchangers, two 100% capacity ACCW pumps, one ACCW surge tank, and associated piping and valves. Cooling is accomplished in the ACCW System through an intermediate closed loop design which is cooled in turn by water directly from the Nuclear Service Cooling Water (NSCW) System (1202).

Because the ACCW System might be contaminated by radioactive materials, it is designed to have lower pressures than those established for the NSCW System, which is open to the atmosphere through the ultimate heat sink cooling towers. Thus radioactive materials would not be released to the environment by the cooling systems. Cooling is provided for the normal charging pump motor coolers, seal water heat exchanger, catalytic hydrogen recombiners, waste gas compressors, pressurizer sample coolers, reactor coolant sample cooler, reactor coolant drain tank heat exchanger, RCP motor coolers, thermal barriers, and bearing lube oil coolers, letdown heat exchanger, excess letdown heat exchanger, and ACCW pump and motor coolers.

Scope Determination Summary

The ACCW heat exchangers are in the NSCW flowpath upstream of the CCW heat exchangers. Since CCW is required for safe shutdown, the integrity of the ACCW heat exchangers must be maintained to ensure NSCW flow to the CCW heat exchangers. Portions of the ACCW System supply and return lines to the RCP thermal barriers are rated for full RCS pressure in case of a thermal barrier leak and system isolation to contain the leak. Also, certain ACCW valves provide containment isolation. The system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related portions of the system are either connected to (and provide support to) safety-related piping and equipment, or could interact spatially with safety-related equipment, therefore the system also meets the 10 CFR 54.4(a)(2) criterion.

Equipment associated with the system is listed on the EQ master list, therefore the ACCW System meets the 10 CFR 54.4(a)(3) EQ criterion. ACCW equipment is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Auxiliary Component Cooling Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

VEGP UFSAR References

The Auxiliary Component Cooling Water System is discussed in VEGP UFSAR Section 9.2.8, Auxiliary Component Cooling Water System.

License Renewal Drawings

1X4LD138-1
1X4LD138-2
1X4LD139
2X4LD138-1
2X4LD138-2
2X4LD139

Components Subject to an AMR

Flexible hoses installed on the Normal Charging Pump motor cooler ACCW supply and return lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.6 lists the components subject to aging management review and the component intended function.

Table 2.3.3.6 Auxiliary Component Cooling Water System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Pressure Boundary Flow Restriction
3	Heat Exchangers - ACCW HXs (Channel Heads)	Pressure Boundary
4	Heat Exchangers - ACCW HXs (Shells)	Pressure Boundary
5	Heat Exchangers - ACCW HXs (Tubes)	Pressure Boundary
6	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary
7	Motor Coolers - ACCW Pumps (Channel Heads)	Pressure Boundary
8	Motor Coolers - ACCW Pumps (Shells)	Pressure Boundary
9	Motor Coolers - ACCW Pumps (Tubes)	Pressure Boundary
10	Motor Coolers - ACCW Pumps (Tubesheets)	Pressure Boundary
11	Piping Components	Pressure Boundary
12	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
13	Pump Casings - ACCW Pumps	Pressure Boundary
14	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary
15	Tanks - ACCW Surge Tanks	Pressure Boundary
16	Valve Bodies	Pressure Boundary

2.3.3.7 Turbine Plant Cooling Water System (1405)

System Description

The Turbine Plant Cooling Water System (TPCWS) supplies cooling water to remove heat from nonsafety-related heat exchangers. The system provides cooling water to the turbine plant closed loop cooling water heat exchangers, main turbine lube oil coolers, normal cooling water system chillers, steam generator blowdown trim heat exchangers, CVCS chillers, generator hydrogen coolers, isophase bus coolers, vacuum pump seal water coolers, and generator stator coolers.

Scope Determination Summary

Portions of the TPCW piping and valves in safety-related structures could interact spatially with safety-related equipment; therefore the system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Turbine Plant Cooling Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Turbine Plant Cooling Water Systems is discussed in VEGP UFSAR Section 9.2.11, Turbine Plant Cooling Water System.

License Renewal Drawings

1X4LD151-2 2X4LD151-2

Components Subject to an AMR

Table 2.3.3.7 Turbine Plant Cooling Water System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Pressure Boundary
3	Piping Components	Pressure Boundary
4	Strainer Housings	Pressure Boundary
5	Valve Bodies	Pressure Boundary

2.3.3.8 River Intake Structure System (1402)

System Description

The primary functions of the River Intake Structure System are to provide makeup water to the circulating water system hyperbolic cooling towers, to provide an alternate source of makeup to the nuclear service cooling water (NSCW) towers, and to dilute the discharge of plant effluent as required to meet the limits of 10 CFR Part 20.

Scope Determination Summary

The portion of the River Intake Structure System within the NSCW towers could interact spatially with safety-related components inside the towers; therefore the system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the River Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The River Intake Structure System is discussed in VEGP UFSAR Section 10.4.5.2.2 C and VEGP UFSAR Section 10.4.5.2.3.

License Renewal Drawings

1X4LD133-1
1X4LD133-2
2X4LD133-1
2X4LD133-2

Components Subject to an AMR

Table 2.3.3.8 River Intake Structure System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Piping Components	Pressure Boundary
3	Valve Bodies	Pressure Boundary

2.3.3.9 Compressed Air System

The Compressed Air LRA System includes the following VEGP systems:

- Instrument, Service, and Breathing Air (2401)
- Instrument Air System (2420)

System Description

The Compressed Air System provides a continuous supply of filtered, dry, oil-free compressed air for pneumatic instrument operation and control of pneumatic actuators. The system also supplies compressed, normally filtered, dry, and oil-free service air to outlets throughout the plant for operation of pneumatic tools and other service air requirements. There are two rotary compressor trains and one reciprocating compressor train located in each unit. The outlets from the air receivers of these three trains are connected to a common line which is the compressed air supply line for that unit. The third reciprocating compressor train, which is located in Unit 1, is piped so that it can be aligned to either the Unit 1 or Unit 2 compressed air supply line.

The compressed air supply line in each unit branches to supply both the Service Air System and the Instrument Air System for that unit. The Service Air System consists of a prefilter, a dryer, and an afterfilter, from which the air flows to the various service air loops. The Instrument Air System consists of two dryers in parallel, each having a prefilter and afterfilter. The air from the system flows to the various instrument air loops in the unit.

Scope Determination Summary

Although all pneumatically operated valves serviced by this system essential for safe shutdown and accident mitigation are designed to assume a fail-safe position upon loss of air pressure, portions of this system are considered safety-related due to the containment isolation function. The system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Portions of the piping attached to the safety-related containment isolation branches provide support in the stress analysis for the safety-related piping and are in scope based on the 10 CFR 54.4(a)(2) criterion.

Equipment associated with the system is listed on the EQ master list, therefore the Compressed Air System meets the 10 CFR 54.4(a)(3) EQ criterion.

The following 10 CFR 54.4 criteria are met by the Compressed Air System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Compressed Air System is discussed in VEGP UFSAR Section 9.3.1, Compressed Air System.

License Renewal Drawings

1X4LD186-1
1X4LD186-4

2X4LD186-1
2X4LD186-4
2X4LD186-6

Components Subject to an AMR

Table 2.3.3.9 Compressed Air System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Piping Components	Pressure Boundary
4	Valve Bodies	Pressure Boundary

2.3.3.10 Chemical and Volume Control and Boron Recycle Systems

The Chemical and Volume Control and Boron Recycle Systems include the following VEGP systems:

- CVCS (1208-CVCS)
- Boron Recycle System (BRS) (1210)

Chemical and Volume Control System

System Description

The Chemical and Volume Control System maintains the required inventory in the RCS by maintaining the programmed water level in the pressurizer through charging and letdown. The CVCS provides a continuous charging and letdown of reactor coolant water which is used in the control of water chemistry conditions, activity level, and soluble chemical neutron absorber concentration. The CVCS also provides seal water injection flow to the reactor coolant pumps. Portions of the system contain borated water at higher concentration than the RCS for use in maintaining reactor shutdown margin.

CVCS consists of one Normal Charging Pump and two standby Centrifugal Charging Pumps. The Centrifugal Charging Pumps also act to provide safety injection flow as described in Section 2.3.2.2. In addition, the system contains a letdown heat exchanger, an excess letdown heat exchanger, a regenerative heat exchanger, a volume control tank, and associated piping, valves and filters. CVCS also includes demineralizer vessels and chemical tanks associated with control of water chemistry of the RCS. The system includes provisions for recycling reactor grade water. Portions of the CVCS (1208-ECCS) function as part of the ECCS to provide injection flow to the RCS during post-accident injection and recirculation. The ECCS functions are described in Section 2.3.2.2 of this application.

Scope Determination Summary

The CVCS is required for safe plant shutdown. The system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related portions of the system are either connected to (and provide support to) safety-related piping and equipment, or could interact spatially with safety-related equipment; therefore the system also meets the 10 CFR 54.4(a)(2) criterion. The shell sides of certain heat exchangers also meet the 10 CFR 54.4(a)(2) criterion.

Equipment associated with the system is listed on the EQ master list, therefore the CVCS meets the 10 CFR 54.4(a)(3) EQ criterion. The CVCS is credited to support mitigation of the

SBO event in the SBO Analysis Report (letdown isolation), therefore the system meets the 10 CFR 54.4(a)(3) criterion for SBO. CVCS equipment is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Chemical and Volume Control System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X		

<u>Boron Recycle System</u>

System Description

The Boron Recycle System (BRS) portion of the CVCS processes reactor coolant effluent that can be readily reused as makeup and decontaminates the effluent by means of demineralization. The Thermal Regeneration System portion of the CVCS can be used during reactor coolant boration and dilution operations, when letdown flow from the RCS may be directed to the thermal regeneration demineralizers to adjust boric acid concentration in the reactor coolant. The function of this system is not safety-related. Safety-related boration and dilution is performed by the CVCS.

Scope Determination Summary

The recycle holdup tanks and some attached piping and components are conservatively classified as safety-related in the CLB. The system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related portions of the system are either connected to (and provide support to) safety-related piping and equipment, or could interact spatially with safety-related equipment; therefore the system also meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Boron Recycle System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The CVCS is discussed in VEGP UFSAR Section 9.3.4.1, Chemical and Volume Control System.

The BRS is discussed in VEGP UFSAR Section 9.3.4.2, Boron Recycle System.

License Renewal Drawings

1X4LD111	2X4LD111
1X4LD112	2X4LD112
1X4LD114	2X4LD114
1X4LD115	2X4LD115
1X4LD116-1	2X4LD116-1
1X4LD116-2	2X4LD116-2
1X4LD117	2X4LD117
1X4LD118	2X4LD118
1X4LD121	2X4LD121
AX4LD123-1	2X4LD124
AX4LD123-2	2X4LD128
AX4LD123-3	2X4LD130
1X4LD124	2X4LD139
1X4LD128	2X4LD140-1
1X4LD129	2X4LD147-1
1X4LD130	2X4LD148-1
1X4LD139	2X4LD148-2
1X4LD140-1	2X4LD148-3
1X4LD145-3	2X4LD148-4
1X4LD147-1	
1X4LD148-1	
1X4LD148-2	
1X4LD148-3	
1X4LD148-4	
AX4LD148-5	
AX4LD148-6	
AX4LD148-7	
1X4LD184	2X4LD184
AX4LD190-2	

Components Subject to an AMR

Table 2.3.3.10 Chemical and Volume Control and Boron Recycle Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Demineralizer Vessels	Pressure Boundary
3	Filter Housings	Pressure Boundary
4	Flow Orifice / Elements	Flow Restriction Pressure Boundary
5	Heat Exchangers - Excess Letdown HXs (Channel Heads)	Pressure Boundary
6	Heat Exchangers - Excess Letdown HXs (Shells)	Pressure Boundary
7	Heat Exchangers - Excess Letdown HXs (Tubes & Tubesheets)	Pressure Boundary
8	Heat Exchangers - Letdown Chillers (Channel Heads)	Pressure Boundary
9	Heat Exchangers - Letdown Chillers (Shells)	Pressure Boundary
10	Heat Exchangers - Letdown Chillers (Tubes)	Pressure Boundary
11	Heat Exchangers - Letdown HXs (Channel Heads)	Pressure Boundary
12	Heat Exchangers - Letdown HXs (Shells)	Pressure Boundary
13	Heat Exchangers - Letdown HXs (Tubes & Tubesheets)	Pressure Boundary
14	Heat Exchangers - Letdown Reheat HXs (Channel Heads)	Pressure Boundary
15	Heat Exchangers - Letdown Reheat HXs (Shells)	Pressure Boundary
16	Heat Exchangers - Letdown Reheat HXs (Tubes & Tubesheets)	Pressure Boundary

Table 2.3.3.10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
17	Heat Exchangers - Moderating HXs (Channel Heads)	Pressure Boundary
18	Heat Exchangers - Moderating HXs (Shells)	Pressure Boundary
19	Heat Exchangers - Moderating HXs (Tubes & Tubesheets)	Pressure Boundary
20	Heat Exchangers - Regenerative HXs (Channel Heads	Pressure Boundary
21	Heat Exchangers - Regenerative HXs (Shells)	Pressure Boundary
22	Heat Exchangers - Regenerative HXs (Tubes & Tubesheets)	Pressure Boundary
23	Heat Exchangers - Seal Water HXs (Channel Heads)	Pressure Boundary
24	Heat Exchangers - Seal Water HXs (Shells)	Pressure Boundary
25	Heat Exchangers - Seal Water HXs (Tubes & Tubesheets)	Pressure Boundary
26	Letdown Orifices	Flow Restriction Pressure Boundary
27	Motor Coolers - Normal Charging Pumps (Channel Heads)	Pressure Boundary
28	Motor Coolers - Normal Charging Pumps (Shells)	Pressure Boundary
29	Motor Coolers - Normal Charging Pumps (Tubes)	Pressure Boundary
30	Motor Coolers - Normal Charging Pumps (Tubesheets)	Pressure Boundary
31	Piping Components	Pressure Boundary
32	Piping Components - Pipe Spools for Startup	Pressure Boundary

Table 2.3.3.10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
	Strainers	
33	Pump Casings - Boric Acid Transfer Pumps	Pressure Boundary
34	Pump Casings - CVCS Recycle Feed Pumps	Pressure Boundary
35	Pump Casings - Normal Charging Pumps	Pressure Boundary
36	Pump Casings - Zinc Addition Injection Pumps	Pressure Boundary
37	Tank Diaphragms – Boric Acid Storage Tanks	Physical Integrity
38	Tanks - Boric Acid Batching Tanks	Pressure Boundary
39	Tanks - Boric Acid Storage Tanks	Pressure Boundary
40	Tanks - Boron Meter Tanks	Pressure Boundary
41	Tanks - Chemical Mixing Tanks	Pressure Boundary
42	Tanks - Recycle Holdup Tanks	Pressure Boundary
43	Tanks - Volume Control Tanks	Pressure Boundary
44	Valve Bodies	Pressure Boundary

2.3.3.11 Ventilation Systems – Control Building

The Ventilation Systems - Control Building includes the following VEGP systems:

- Control Room Area HVAC System (1531)
- Control Building Safety Feature Electrical Equipment Room HVAC System (1532)
- Control Building Wing Area, Levels A, B, 1 and 2 Normal HVAC System (1533)
- Control Building Lab Hood and Laboratory Area Ventilation System (1535)
- Control Building Locker and Toilet Exhaust System (1537)
- Control Building Cable Spreading Rooms HVAC System (1539)
- Electrical Penetration Filter Exhaust System (1562)
- Onsite Technical Support Center HVAC System (1563)

Control Room Area HVAC System

System Description

The Control Room Area HVAC System operates in either the normal or emergency mode. In the normal mode the system supplies conditioned air to the control room area during normal plant operating conditions to provide personnel comfort and to maintain a suitable operating environment for equipment.

Should gaseous fission product levels exceed limits in the outside air intake, the normal control room HVAC system would be isolated and the system re-aligned to the emergency mode where a small amount of filtered outside air is provided to maintain a control room envelope pressurization utilizing high efficiency filtration units. The system also switches to the emergency mode upon receipt of a safety injection signal or manual actuation. The four safety-related filtration units are provided with train-related cooling coils which take cooling water from the Essential Chilled Water System. The Control Room Emergency HVAC System is shared by both Units 1 and 2, with the air ducts serving the control room forming a common system connected to the Units 1 and 2 safety-related air handling units.

Scope Determination Summary

Maintaining a suitable control room environment is required for accident mitigation and safe plant shutdown. The Control Room Area HVAC System is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related ductwork associated with this system is connected to (and provides support to) safety-related ductwork. The system therefore meets the 10 CFR 54.4(a)(2) criterion.

The Control Room Area HVAC System is credited to support mitigation of the SBO event in the SBO Analysis Report, therefore the system meets the 10 CFR 54.4(a)(3) criterion for SBO. Control room cooling is provided by the non-SBO unit. Equipment associated with this system is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Room Area HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X		

Control Building Safety Feature Electrical Equipment Room HVAC System

System Description

The Control Building Safety Feature Electrical Equipment Room HVAC System provides a proper environment and temperature for electrical equipment and maintenance personnel during normal and postulated accident conditions. During normal operations, cooling is provided by cooling coils which are provided cooling water from the Normal Chilled Water System. Under design basis accident conditions, two cooling trains are provided by cooling coils which are provided cooling water from the Essential Chilled Water System. Each train of the system is powered from a separate and independent Class 1E power system. This system also provides continuous exhaust to minimize the accumulation of hydrogen gas within the battery rooms.

Scope Determination Summary

Maintaining a suitable environment in the Control Building Safety Feature Electrical Equipment Room is required for accident mitigation and safe plant shutdown. The HVAC system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Equipment associated with this system is listed on the Fire Event Safe Shutdown Systems/Components table, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Building Safety Feature Electrical Equipment Room HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X				X		

<u>Control Building Wing Area Levels A, B, 1 and 2 Normal HVAC System</u>

System Description

The Control Building Wing Area Levels A, B, 1 and 2 Normal HVAC System provides ventilation, cooling, heating and smoke removal for operating personnel during normal conditions. Cooling coils are provided with cooling water from the Normal Chilled Water System.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings in this system are relied upon as missile barriers (for the fan element). This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Building Wing Area Levels A, B, 1, and 2 Normal HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

Control Building Laboratory Hood and Laboratory Area Ventilation System

System Description

The Control Building Laboratory Hood and Laboratory Area Ventilation System provides exhaust airflow and auxiliary makeup airflow necessary for the proper operation of the laboratory hoods. The system is also designed to purge the laboratory area of airborne radioactive contamination. The air passing through the hoods and laboratory area is passed through carbon filters before being discharged to the atmosphere. Safety-related components for this system are limited to the tornado dampers and associated ductwork.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related, therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings in this system are relied upon as missile barriers (for the fan element). This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Building Laboratory Hood and Laboratory Area Ventilation System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

Control Building Locker and Toilet Exhaust System

System Description

The Control Building Locker and Toilet Exhaust System purges the locker, shower, storage, toilet and Control Building level 2 battery areas by exhausting to the atmosphere the air supplied to these areas during normal operating conditions.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Building Locker and Toilet Exhaust System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X				X		

Control Building Cable Spreading Rooms HVAC System

System Description

The Control Building Cable Spreading Rooms HVAC System provides cooling, heating and ventilation for the cable spreading, auxiliary relay, normal air-conditioning, electric equipment and computer rooms during normal conditions. The system is also designed to provide emergency cooling to the auxiliary relay, normal air-conditioning and electric equipment rooms, which is a safety-related function. These emergency cooling coils are provided cooling water from the Essential Chilled Water System. The other safety-related portions of this system are the tornado dampers and associated ductwork.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related. Also, HVAC for the auxiliary relay, normal air conditioning, and electric equipment rooms is a safety-related function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related drain piping is connected to (and provides support to) safety-related fan coil units and is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance. Also, certain equipment is listed on the fire safe shutdown list. Therefore, the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Control Building Cable Spreading Rooms HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

<u>Electrical Penetration Filter Exhaust System</u>

System Description

The Electrical Penetration Filter Exhaust System fans and filtration units for Unit 1 have been abandoned in place, and were never installed on Unit 2. Ductwork and dampers associated with this system are in use to provide normal ventilation.

Scope Determination Summary

A portion of the ductwork is tornado proof and supports a safety-related function and therefore is within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion. The system also includes some nonsafety-related ductwork that is connected to (and provides support to) safety-related components.

Some fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance. Therefore, the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Electrical Penetration Filter Exhaust System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X			X		

<u>Onsite Technical Support Center HVAC System</u>

System Description

The Onsite Technical Support Center HVAC System provides environmental control for habitability, supports computer operational requirements, and provides filtration of potentially radioactive particulates and iodine gas during normal and emergency plant operations. This system is not safety-related but contains certain fire dampers which are within the scope of license renewal.

Scope Determination Summary

Technical Support Center fire dampers are relied upon for 10 CFR 50.48 compliance. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Onsite Technical Support Center HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

VEGP UFSAR References

The Control Building Ventilation Systems are discussed in the following UFSAR sections:

- Control Room Area HVAC System – VEGP UFSAR Section 6.4 and Section 9.4.1
- Control Building Safety Feature Electrical Equipment Room HVAC System – VEGP UFSAR Section 9.4.5
- Control Building Wing Area, Levels A, B, 1 and 2 Normal HVAC System – VEGP UFSAR Section 9.4.1
- Control Building Lab Hood and Laboratory Area Ventilation System – VEGP UFSAR Section 9.4.1
- Control Building Locker and Toilet Exhaust System – VEGP UFSAR Section 9.4.1
- Control Building Cable Spreading Rooms HVAC System – VEGP UFSAR Section 9.4.1
- Electrical Penetration Filter Exhaust System – n/a
- Onsite Technical Support Center HVAC System – VEGP UFSAR Section 9.4.1.8

License Renewal Drawings

1X4LD207-1
1X4LD209
1X4LD210
1X4LD211
AX4LD206-1
AX4LD206-2
AX4LD206-3
AX4LD215
AX4LD216
AX4LD223
AX4LD225
AX4LD235
AX4LD237
AX4LD241
AX4LD242-2

2X4LD207-1
2X4LD209
2X4LD210
2X4LD211

Components Subject to an AMR

Table 2.3.3.11 Control Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	AC Units (ESF) Housings	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Control Rm Filter and Fan Unit Housings	Pressure Boundary
4	Control Rm Filter and Fan Unit Moisture Eliminators	Moisture Elimination
5	Cooling Coils (Essential Chilled Water)	Exchange Heat Pressure Boundary
6	Cooling Coils (Normal Chilled Water)	Pressure Boundary
7	Damper Housings	Pressure Boundary
8	Duct Silencer Housings	Pressure Boundary
9	Ductwork & Fittings	Pressure Boundary
10	Fan Housings	Missile Barrier Pressure Boundary
11	Flexible Connectors	Pressure Boundary
12	Heater Housings	Pressure Boundary
13	Piping Components	Pressure Boundary
14	Sealants	Pressure Boundary

2.3.3.12 Ventilation Systems – Auxiliary Building

The Auxiliary Building Ventilation Systems include the following VEGP systems:

- Auxiliary Building Outside Air Supply and Normal HVAC (1551)
- Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System (1553)
- Auxiliary Building ESF Room Coolers (1555)
- Piping Penetration Filter Exhaust System (1561)

Auxiliary Building Outside Air Supply and Normal HVAC System

System Description

The Auxiliary Building (AB) Outside Air Supply and Normal HVAC System provides the quantity of outside air required to maintain the AB activity level within acceptable limits. The system also provides heating and cooling, maintaining the building within acceptable temperature limits during normal operation. This system works in conjunction with the AB Radwaste Area Filter Exhaust System which filters and exhausts the supply air, maintaining negative pressurization in the AB for radioactivity control. A containment isolation signal isolates the AB Outside Air Supply and Normal HVAC System from the AB Penetration Filter Exhaust System.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings in this system are relied upon as missile barriers (for the fan element), and certain nonsafety-related cooling coils could interact spatially with safety-related components. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. Fire dampers in this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Auxiliary Building Outside Air Supply and Normal HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

<u>Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System</u>

System Description

The Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System maintains negative pressure in the Auxiliary Building by exhausting more air from the building than is being supplied to ensure that there will be no unfiltered leakage of potentially contaminated air to the environment. This system also provides exhaust from the Radwaste Transfer Building and Radwaste Transfer Tunnel. The system filters all exhaust air to collect any fission products prior to discharging the air through the Equipment Building stack. A containment isolation signal isolates the Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System from the Auxiliary Building Penetration Filter Exhaust System.

Scope Determination Summary

Tornado dampers and associated ductwork in this system are considered safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings in this system are relied upon as missile barriers (for the fan element), therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. Fire dampers in this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

Auxiliary Building Engineered Safety Feature Room Coolers

System Description

The Auxiliary Building Engineered Safety Feature Room Coolers provide cooling in safety-related switchgear, motor control centers, and pump rooms during post-accident conditions, loss-of-offsite power, and normal conditions. Each equipment room is cooled by a unit powered by the same safety features train as that associated with the equipment in the room. Train-related essential chilled water is also provided to the individual fan-coil units in use during the emergency conditions noted above.

Scope Determination Summary

Cooling of the Auxiliary Building Engineered Safety Feature Room is required for accident mitigation and safe plant shutdown. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related condensate drain lines that are connected to the safety-related cooling units meet the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. Certain equipment associated with this system is listed on the fire safe shutdown list. Therefore, the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Auxiliary Building Engineered Safety Feature Room Coolers:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

Piping Penetration Filter Exhaust System

System Description

The Piping Penetration Filter Exhaust System is a safety-related system that minimizes the release of airborne radioactivity to the outside atmosphere resulting from containment leakage into the piping penetration areas during accident conditions. This is accomplished by exhausting air and thereby maintaining a negative pressure in the piping penetration areas. The exhaust air is filtered to remove fission products before being released through the vent stack. A portion of the exhaust air passes through cooling coils and is recirculated back to the piping penetration areas for cooling. A containment ventilation isolation signal isolates the Piping Penetration Filter Exhaust System from the normal Auxiliary Building supply and exhaust systems, energizing the piping penetration exhaust fan and filter. Cooling coils are supplied cooling water from the NSCW System.

Scope Determination Summary

The Piping Penetration Filter Exhaust System is relied on to minimize the release of airborne radioactivity from the plant during accident conditions. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping and exhaust vent ductwork in this system are connected to (and provide support to) safety-related piping, ductwork, or other components. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Fire dampers in this system are relied upon for 10 CFR 50.48 compliance, therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Piping Penetration Filter Exhaust System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

VEGP UFSAR References

The Auxiliary Building Ventilation Systems are discussed in the following UFSAR sections:

- Auxiliary Building Outside Air Supply and Normal HVAC – VEGP UFSAR Section 9.4.3.1
- Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System – VEGP UFSAR Section 9.4.3.1
- Auxiliary Building ESF Room Coolers – VEGP UFSAR Section 9.4.3.2
- Piping Penetration Filter Exhaust System – VEGP UFSAR Section 9.4.3.2

License Renewal Drawings

1X4LD203	2X4LD203
1X4LD205-1	2X4LD205-1
1X4LD205-2	2X4LD205-2
1X4LD208-1	2X4LD208-1
1X4LD208-2	2X4LD208-2
1X4LD208-3	2X4LD208-3
1X4LD228	2X4LD228
AX4LD353	

Components Subject to an AMR

Table 2.3.3.12 Auxiliary Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Cooling Coils (Essential Chilled Water)	Exchange Heat Pressure Boundary
3	Cooling Coils (Normal Chilled Water)	Pressure Boundary
4	Cooling Coils (NSCW)	Exchange Heat Pressure Boundary
5	Damper Housings	Pressure Boundary
6	Ductwork & Fittings	Pressure Boundary
7	Fan Housings	Missile Barrier
8	Flexible Connectors	Pressure Boundary
9	Piping Components	Pressure Boundary
10	Piping Penetration Area Cooler Housings	Pressure Boundary
11	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary
12	Piping Penetration Filter and Fan Unit Moisture Eliminators	Moisture Elimination
13	Room Cooler Housings	Pressure Boundary

2.3.3.13 Ventilation Systems – Containment Building

The Containment Building (CTB) Ventilation Systems include the following VEGP systems:

- Containment Building Air Cooling System (1501)
- Containment Building Lower Level Air Circulating System (1503)
- Containment Building Preaccess Filter System (1504)
- Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems (1505)
- Containment Building Minipurge Exhaust and Normal Preaccess Purge Exhaust Systems (1506)
- Containment Building Post-LOCA Purge Exhaust System (1508)
- Containment Building Cavity Cooling System (1511)
- Containment Building Reactor Support Cooling System (1512)
- Containment Building Auxiliary Air Cooling System (1515)
- Containment Building Post-LOCA Cavity Purge System (1516)

Containment Building Air Cooling System

System Description

The Containment Building Air Cooling System is a safety-related system that reduces the containment temperature and pressure following a LOCA or MSLB accident inside containment by removing thermal energy. The system consists of eight air coolers per unit and their associated ductwork and dampers. The containment coolers are divided into two trains consisting of four fan coolers each. All coolers automatically receive a start signal when a safety injection signal is generated. The Containment Building Air Cooling System also supports reactor coolant leak detection during normal operation. Air cooler condensate is collected and measured in a standpipe. If the condensate rises above a preset level in the standpipe, a high condensate flow alarm is annunciated in the control room.

Scope Determination Summary

The Containment Building Air Cooling System is credited for accident mitigation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related vents and drains associated with this system are attached to safety-related components. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Air Cooling System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

<u>Containment Building Lower Level Air Circulating System</u>

System Description

This system provides air mixing of the containment lower level to prevent local hot spots. The system fans provide horizontal circulation in the area below the operating deck during normal operations.

Scope Determination Summary

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Containment Building Lower Level Air Circulating System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Containment Building Preaccess Filter System

System Description

The Containment Building Preaccess Filter System, together with the Normal Purge System, controls the airborne radioactivity inside containment. The Containment Building Preaccess Filter System provides air circulation and filtration without air makeup of containment to reduce airborne radioactivity levels in the containment atmosphere below the level required for personnel access for inspection, maintenance, and refueling operations.

Scope Determination Summary

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Containment Building Preaccess Filter System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems

System Description

The Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems provide filtered outside air to the containment atmosphere for adequate ventilation and personnel comfort while the plant is shut down, and to help reduce airborne contaminants and control pressure buildup inside containment during normal operations.

Scope Determination Summary

Valves associated with this system are relied upon for containment isolation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). Also, certain nonsafety-related piping is connected to (and provides support to) safety-related piping and components. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Containment Building Minipurge Exhaust and Normal Preaccess Purge Exhaust Systems

System Description

The Containment Building Minipurge Exhaust and Normal Preaccess Purge Exhaust Systems provide the necessary containment ventilation air exhaust and filtration in support of the Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems. The air is exhausted out through the plant vent.

Scope Determination Summary

Valves associated with this system are relied upon for containment isolation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). Also, certain nonsafety-related piping is connected to (and provides support to) safety-related piping and components. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Minipurge Exhaust and Normal Preaccess Purge Exhaust Systems						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Containment Building Post-LOCA Purge Exhaust System

System Description

The Containment Building Post-LOCA Purge Exhaust System is designed to allow containment purging as a backup to the Hydrogen Recombiner System to maintain the post-accident hydrogen concentration below the combustible limit. The system may be used post-LOCA in conjunction with a portable air compressor through the seismic Category I portion of the service air piping to provide the purge motive force. The air is removed through ducting in the containment dome area, then passes through the seismic Category I containment penetrations, and through the filter units where it is exhausted through the vent stack.

Scope Determination Summary

Valves associated with this system are relied upon for containment isolation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). Also, certain nonsafety-related piping is connected to (and provides support to) safety-related piping and components. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Post-LOCA Purge Exhaust System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Containment Building Cavity Cooling System

System Description

The Containment Building Cavity Cooling System is designed to provide cooling for the reactor cavity. With cooling water provided by the Nuclear Service Cooling Water System, the Containment Building Cavity Cooling Units operate in conjunction with the Containment Building Air Cooling System to provide cooling to the primary shield concrete and nuclear instrumentation. The system operates during normal and loss-of-offsite power (LOSP) conditions. The cooling fans are automatically loaded on a bus energized by the diesel generator upon LOSP, but the fans must be manually loaded following a LOCA. Safety-related portions of the system include the cooling coils and cavity pressure relief dampers. This system is also in scope under 10 CFR 54.4(a)(2) due to the missile barrier function of the associated fan housings.

Scope Determination Summary

The cooling coils associated with the Containment Building Cavity Cooling System are relied upon as a pressure boundary for the Nuclear Service Cooling Water System. Also, cavity pressure relief dampers protect the reactor cavity from over pressure. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). This system therefore meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Cavity Cooling System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

<u>Containment Building Reactor Support Cooling System</u>

System Description

The Containment Building Reactor Support Cooling System operates in conjunction with the Reactor Cavity Cooling System to provide cooling for the reactor supports. The Containment Building reactor support cooling fans exhaust air from the reactor vessel supports to maintain the concrete within its operating temperature limit during normal and loss-of-offsite power (LOSP) conditions.

Scope Determination Summary

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). This system therefore meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Containment Building Reactor Support Cooling System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

<u>Containment Building Auxiliary Air Cooling System</u>

System Description

The Containment Building Auxiliary Air Cooling System is designed to remove the excess thermal energy from the containment atmosphere due to heat losses of operating equipment during normal power generation and refueling outages. The system augments the Containment Cooling System cooling capacity by an amount equivalent to the heat rejected from the CRDM unit fans. The system supports reactor coolant leak detection during normal operation by collecting and measuring air cooler condensate in a standpipe.

Scope Determination Summary

The cooling coils associated with the Containment Building Auxiliary Air Cooling System are relied upon as a pressure boundary for the Nuclear Service Cooling Water System. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). This system therefore meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Containment Building Auxiliary Air Cooling System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

<u>Containment Building Post-LOCA Cavity Purge System</u>

System Description

The Containment Building Post-LOCA Cavity Purge System is designed to prevent hydrogen pocketing in the reactor cavity after a LOCA by supplying air to the reactor cavity to maintain hydrogen concentration below the combustible limit, which is a safety-related function. The system is supplied with Class 1E power, each redundant train being connected to separate safety buses. The system meets seismic Category I criteria and is designed to automatically start upon receipt of a safety injection signal.

Scope Determination Summary

The Containment Building Post-LOCA Cavity Purge System is credited for accident mitigation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment Building Post-LOCA Cavity Purge System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X		X				

VEGP UFSAR References

The Containment Building Ventilation Systems are discussed in the following UFSAR sections:

- Containment Building Air Cooling System – VEGP UFSAR Section 6.2.2.1 and Section 9.4.6
- Containment Building Lower Level Air Circulating System – VEGP UFSAR Section 9.4.6
- Containment Building Preaccess Filter System – VEGP UFSAR Section 9.4.6
- Containment Building Minipurge Supply and Normal Preaccess Purge Supply Systems – VEGP UFSAR Section 9.4.6
- Containment Building Minipurge Exhaust and Normal Preaccess Purge Exhaust Systems – VEGP UFSAR Section 9.4.6
- Containment Building Post-LOCA Purge – VEGP UFSAR Section 6.2.5
- Containment Building Cavity Cooling System – VEGP UFSAR Section 9.4.6
- Containment Building Reactor Support Cooling System – VEGP UFSAR Section 9.4.6
- Containment Building Auxiliary Air Cooling System – VEGP UFSAR Section 9.4.6
- Containment Building Post-LOCA Cavity Purge System – VEGP UFSAR Section 6.2.5

License Renewal Drawings

1X4LD135-1	2X4LD135-1
1X4LD135-2	2X4LD135-2
1X4LD212	2X4LD212
1X4LD213-1	2X4LD213-1
1X4LD213-2	2X4LD213-2
1X4LD214-1	2X4LD214-1
1X4LD214-2	2X4LD214-2

Components Subject to an AMR

Table 2.3.3.13 Containment Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Cooling Coils (NSCW)	Exchange Heat Pressure Boundary
3	CTB Aux Cooling Unit Housings	Missile Barrier Pressure Boundary
4	CTB Cooling Unit Housings	Pressure Boundary
5	Damper Housings	Pressure Boundary
6	Ductwork & Fittings	Pressure Boundary
7	Fan Housings	Missile Barrier Pressure Boundary
8	Flexible Connectors	Pressure Boundary
9	Flow Orifice / Elements	Flow Restriction Pressure Boundary
10	Piping Components	Pressure Boundary
11	Valve Bodies	Pressure Boundary

2.3.3.14 Ventilation Systems – Fuel Handling Building

The Fuel Handling Building (FHB) Ventilation LRA System includes the following VEGP systems:

- Fuel Handling Building Normal HVAC System (1541)
- Fuel Handling Building Post-Accident Exhaust System (1542)

Fuel Handling Building Normal HVAC System

System Description

The Fuel Handling Building Normal HVAC System provides the Fuel Handling Building (which is shared between Units 1 and 2) with heating, cooling, ventilation and filtration to maintain a suitable atmosphere for personnel and equipment during normal operation. Redundant radiation monitors are provided in the FHB normal exhaust ductwork to detect high radiation levels. If radiation levels exceed setpoints, a signal isolates the FHB Normal Exhaust System and initiates the FHB Post-Accident Exhaust System.

Scope Determination Summary

Certain ductwork and dampers associated with the Fuel Handling Building Normal HVAC System interface with the Fuel Handling Building Post-Accident Exhaust System and must maintain integrity in order to maintain negative pressure in the Fuel Handling Building post-accident. Also, tornado dampers and associated ductwork are safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element). Certain cooling water piping and drain piping is either connected to (and provides support to) safety-related piping and equipment, or could interact spatially with safety-related equipment; therefore the system also meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance; this system therefore meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Fuel Handling Building Normal HVAC System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X		X		

Fuel Handling Building Post-Accident Exhaust System

System Description

The Fuel Handling Building Post-Accident Exhaust System is designed to prevent exfiltration of contaminated air from the FHB by filtering and exhausting air from the area after the area has been isolated from the normal FHB ventilation subsystem. The FHB Post-Accident Exhaust System maintains a negative pressure within the area following a fuel handling accident. The system consists of two 100% capacity exhaust filtration units, and associated piping, ductwork, and dampers. The exhaust ductwork from the isolation dampers to the post-accident exhaust filtration units is shared with the FHB Normal HVAC system. In the event of a fuel handling accident that releases radioactivity, radiation monitors in the normal FHB exhaust duct sense high radioactivity and transmit a high radiation signal to the balance of plant (BOP) safety actuation system. This system in turn generates a FHB isolation signal which causes the isolation dampers to close, isolating the FHB from the normal supply and exhaust. Upon receipt of the isolation signal the exhaust filtration units automatically start. The exhaust from the filtration units is ducted to the plant vent. The FHB Post-Accident Exhaust System can also be actuated manually from the control room.

Scope Determination Summary

The Fuel Handling Building Post-Accident Exhaust System mitigates a fuel handling accident. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

The nonsafety-related portion of the exhaust vent path to the plant vent is included in scope based on the 10 CFR 54.4(a)(2) criteria.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Fuel Handling Building Post-Accident Exhaust System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Fuel Handling Building Ventilation System is discussed in VEGP UFSAR Section 9.4.2, Fuel Handling Building Ventilation System.

License Renewal Drawings

AX4LD204-1 AX4LD204-2

Components Subject to an AMR

Table 2.3.3.14 Fuel Handling Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Cooling Coils (Normal Chilled Water)	Pressure Boundary
3	Damper Housings	Pressure Boundary
4	Ductwork & Fittings	Pressure Boundary
5	Fan Housings	Missile Barrier
6	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary
7	FHB Post-Accident Filter and Fan Unit Moisture Eliminators	Moisture Elimination
8	Flexible Connectors	Pressure Boundary
9	Piping Components	Pressure Boundary
10	Valve Bodies	Pressure Boundary

2.3.3.15 Ventilation System – Diesel Generator Building (1566)

System Description

The Diesel Generator Building HVAC System provides ventilation to remove heat from the building during diesel generator operation and to supply sufficient heat, when diesels are not operating, for easier starting of the diesel generators, and to allow personnel occupancy. The system is divided into two subsystems, one engineered safety features (ESF) and one non-ESF. During normal plant operation, the non-ESF heating system maintains a minimum temperature when the diesel generators are not running. Non-ESF ventilation is also provided in the building as required to allow for maintenance and personnel access.

The ESF ventilation system is designed to maintain the maximum temperature of the building below analyzed limits with the diesel generator operating. The building is ventilated with 100-percent outside air at summer design temperatures and employs recirculation and outside ventilation air as the outside air temperature drops in winter. The ESF ventilation equipment is powered by the Class 1E bus of the same train as the diesel generator set being ventilated.

Scope Determination Summary

The Diesel Generator Building HVAC System is credited for accident mitigation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Fire dampers are relied upon for 10 CFR 50.48 compliance, and certain equipment is listed on the Fire Event Safe Shutdown Systems/Components table. This system therefore meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Diesel Generator Building HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X				X		

VEGP UFSAR References

The Diesel Generator Building HVAC System is discussed in VEGP UFSAR Section 9.4.7, Diesel Generator Building Ventilation System.

License Renewal Drawings

1X4LD217 2X4LD217

Components Subject to an AMR

Table 2.3.3.15 Diesel Generator Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Damper Housings	Pressure Boundary
3	Ductwork & Fittings	Pressure Boundary
4	Fan Housings	Pressure Boundary
5	Filter Housings - EDG Control Panel Supply Ventilation	Pressure Boundary
6	Flexible Connectors	Pressure Boundary

2.3.3.16 Ventilation System – Auxiliary Feedwater Pumphouse (1593)

System Description

The Auxiliary Feedwater Pumphouse HVAC System provides heating, cooling and ventilation to provide a suitable environment for equipment and maintenance personnel. The system operates whenever the pumps are operating during normal, accident or loss-of-offsite power conditions.

This system utilizes both ESF and non-ESF outside air supply units. The ESF fans are designed to maintain the temperature in the pump rooms within analyzed limits. The turbine driven auxiliary feedwater pump room is also provided with natural ventilation during a station blackout event by the automatic opening of pneumatically-operated dampers.

Scope Determination Summary

The Auxiliary Feedwater Pumphouse HVAC System is credited for accident mitigation. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Portions of the system support operation of the turbine driven auxiliary feedwater pump in the event of a station blackout (e.g., vents open for natural ventilation cooling), therefore the system meets the 10 CFR 54.4(a)(3) criterion for SBO. Certain equipment associated with this system is listed on the Fire Event Safe Shutdown Systems/Components table. This system therefore meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Auxiliary Feedwater Pumphouse HVAC System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X			X	X		

VEGP UFSAR References

The Auxiliary Feedwater Pumphouse Ventilation System is discussed in VEGP UFSAR Section 9.4.8, Auxiliary Feedwater Pumphouse Ventilation System.

License Renewal Drawings

1X4LD227 2X4LD227

Components Subject to an AMR

Table 2.3.3.16 Auxiliary Feedwater Pumphouse Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Damper Housings	Pressure Boundary
3	Ductwork & Fittings	Pressure Boundary
4	Fan Housings	Pressure Boundary

2.3.3.17 Ventilation Systems – Miscellaneous

Miscellaneous Ventilation Systems includes the following VEGP systems:

- Electrical Tunnel Ventilation System (1540)
- Piping Penetration Ventilation System (1556)
- Fire Protection Facilities Ventilation System (1584)

Electrical Tunnel Ventilation System (1540)

System Description

The Electric Tunnel Ventilation System provides ventilation in the tunnels carrying safety-related train-oriented and/or normal cables and is designed to prevent excessive temperature rise. Ventilation is provided during normal operation, shutdown, refueling, and accident conditions. The tunnels ventilated by essential system components are the two diesel power cable tunnels (Train A and Train B), the two NSCW tower cable tunnels (Train A and Train B), and the Turbine Building and Auxiliary Building Train A tunnel. The tunnel ventilated by normal system components is the Turbine Building chase to Control Building tunnel. Each tunnel is served by its own subsystem.

Scope Determination Summary

Ventilation of the electrical tunnels is a safety-related function required to prevent overheating of electrical cables and failure of safety-related equipment. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance. This system therefore meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Electric Tunnel Ventilation System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X		X		X		

Piping Penetration Ventilation System (1556)

System Description

The Piping Penetration Ventilation System provides cooling air to the main steam and feedwater pipe restraints in the main steam area and steam tunnel to maintain localized concrete temperatures below limits. The system is designed to function during normal plant operation, during startup, cold shutdown, cooldown and hot standby, and during refueling operations. The system is designed to remain functional during loss of offsite power and is powered from the non-Class 1E, Standby Power System.

Scope Determination Summary

Nonsafety-related fan housings associated with this system are relied upon as missile barriers (for the fan element); therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Piping Penetration Ventilation System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Fire Protection Facilities (Fire Protection Pumphouses and Valvehouse) Ventilation System (1584)

System Description

The Fire Protection Facilities Ventilation System uses fans and louvers to provide ventilation for the fire protection pumphouses and fire protection valvehouses in order to maintain the air temperature within these structures at or below design temperature during fire pump operation. Two diesel driven fire pumps are located in one of the pumphouses and an electric motor driven fire pump is located in the other pumphouse. The pump room ventilation components are within the scope of license renewal for fire protection.

Scope Determination Summary

This system is relied upon for proper operation of the fire pumps; therefore the fire protection pumphouse portion of this system is within the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Fire Protection Facilities Ventilation System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

VEGP UFSAR References

The Miscellaneous Ventilation System are discussed in VEGP UFSAR Section 9.4.9, Miscellaneous HVAC Systems.

License Renewal Drawings

CX4LD222
1X4LD238
1X4LD245
2X4LD238
2X4LD245

Components Subject to an AMR

Table 2.3.3.17 Miscellaneous Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Damper Housings	Pressure Boundary
3	Ductwork & Fittings	Pressure Boundary
4	Fan Housings	Missile Barrier Pressure Boundary
5	Filter Housings - Tunnel Supply Air	Pressure Boundary
6	Flexible Connectors	Pressure Boundary

2.3.3.18 Ventilation Systems – Radwaste Buildings (1557)

System Description

This system includes the ventilation systems for the Radwaste Transfer Building, Radwaste Transfer Tunnel, and Dry Active Waste (DAW) Facilities.

The functions of the Radwaste Transfer Building, Radwaste Transfer Tunnel, and DAW Facilities HVAC systems are to:

- Provide heating, cooling and ventilation of the DAW Facility to ensure proper operation of equipment and personal comfort for maintenance or operating personnel;
- Provide suitable air distribution and exhaust to reduce the possible concentrations of radioactive and chemical impurities in the process areas;
- Draw effluent exhaust air from the Radwaste Transfer Building through the Auxiliary Building filtration system;
- Provide ventilation in the tunnel as required for periodic inspection.

The Radwaste Transfer Building and Radwaste Transfer Tunnel HVAC Systems have been abandoned except for the Auxiliary Building filtration system exhaust ductwork from the Auxiliary Building Radwaste Area Filter Exhaust and Continuous Exhaust System. However, a fire damper in the west fire rated wall that prevents smoke and fire from translating to the Auxiliary Building via the Radwaste Transfer Tunnel is in the Fire Protection Program. Therefore, this system is credited for 10 CFR 50.48 compliance and is within the scope of license renewal for fire protection.

Scope Determination Summary

Fire dampers associated with this system are relied upon for 10 CFR 50.48 compliance. This system therefore meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Radwaste Buildings Ventilation System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

VEGP UFSAR References

The Radwaste Buildings Ventilation Systems are discussed in VEGP UFSAR Section 9.4.3.3, Radwaste Building Ventilation System.

License Renewal Drawings

AX4LD353

Components Subject to an AMR

Table 2.3.3.18 Radwaste Building Ventilation Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Damper Housings	Pressure Boundary
2	Ductwork & Fittings	Pressure Boundary

2.3.3.19 Fire Protection Systems

The Fire Protection Systems include the following VEGP systems:

- Fire Protection Water System (2301)
- Fire Protection Seismic Category 1 Water System (2303)
- Fire Protection Halon Systems (2304)

Fire Protection Water System

System Description

The Fire Protection Water System minimizes both the probability and the consequences of postulated fires, and has adequate means for prompt fire detection, control and suppression. The primary goal of the Fire Protection Water System is to ensure the performance of design functions required for safe plant shutdown and to minimize the probability of radioactive releases to the environment in the event of a fire. Fire damage to systems, structures, and components important to safety is either prevented or limited such that at least one redundant train of equipment is available for safe shutdown. The system relies on fire prevention, fire suppression, fire detection and annunciation, suppression system automatic supervision, fire separation and confinement, fire extinguishment, fire brigade implements, and plant design features to minimize fires and their consequences. Fire water suppression systems include fire tanks and pumps, automatic and manual spray and sprinkler systems, hose stations, fire hydrants and hose houses, and fire mains/yard loop headers used to supply water for extinguishing fires. Consumables and short lived components such as fire extinguishers, self-contained breathing apparatus air bottles, fire brigade accouterments like boots, gloves, and helmets, and fire hoses are included in this system.

The fire detection and actuation portion of the system is screened as part of the Electrical and Instrumentation and Controls (see Section 2.5 of this application). Fire dampers are screened as part of the assigned HVAC system. Other passive fire barriers are screened as part of the Structures (see Section 2.4 of this application). The Reactor Coolant Pump Oil Collection System is screened as part of the Reactor Coolant System and Connected Lines, Section 2.3.1.3.

Scope Determination Summary

The Fire Protection System contains some containment isolation valves and associated piping; therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ. The Fire Protection System meets the 10 CFR 54.4 (a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Fire Protection Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X		X		X		

<u>Fire Protection - Seismic Category 1 Water System</u>

System Description

The Fire Protection - Seismic Category 1 Water System supplies fire-extinguishing water for manual hose stations in areas containing equipment required for the safe shutdown of the plant after a safe shutdown earthquake (SSE) which might disable the normal Fire Protection System. This system is provided to fight fires that occur following an SSE in the event no other source of fire-fighting water is available. The system is completely manual and includes manual hose stations and associated stand pipes in the Containment, Diesel Generator, Auxiliary, and Control Buildings. The source of water for this system is the Nuclear Service Cooling Water System which supplies water by means of manual valves which are normally locked closed.

Scope Determination Summary

The Fire Protection – Seismic Category 1 Water System meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Fire Protection Seismic Category 1 Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

Fire Protection Halon System

System Description

The Fire Protection Halon System provides Halon fire-extinguishing gas to protect certain electrical equipment which supports safe plant shutdown. The system is composed of Halon cylinders, discharge piping, local Halon control panel, and associated instruments. The shutdown panels in the shutdown panel rooms in the Control Building and ventilation equipment in the records storage room in the Control Building support safe plant shutdown and are protected from fire by packaged Halon flooding systems. Other plant spaces and electrical equipment that do not support safe plant shutdown but are fire protected by packaged Halon systems include the plant operating computer; communications room in the Service Building; plant documentation storage rooms in the Service Building; and the communication, computer, CRT display, and electrical equipment rooms in the Technical Support Center.

Scope Determination Summary

The Fire Protection Halon System meets the 10 CFR 54.4 (a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Fire Protection Halon System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

VEGP UFSAR References

The Fire Protection System is discussed in VEGP UFSAR Section 9.5.1, Fire Protection System, and VEGP UFSAR Appendix 9B, Comparison of VEGP Units 1 and 2 with Requirements of the Branch Technical Position CMEB 9.5-1.

License Renewal Drawings

CX4LD173-1	
CX4LD173-2	
CX4LD173-4	
1X4LD144-2	
1X4LD174-1	2X4LD174-1
1X4LD174-2	2X4LD174-2
1X4LD174-3	2X4LD174-3
1X4LD174-4	2X4LD174-4
1X4LD174-6	2X4LD174-6
AX4LD204-1	
1X4LD205-1	2X4LD205-1
AX4LD206-1	
AX4LD206-3	
1X4LD208-1	2X4LD208-1
1X4LD209	
1X4LD213-1	2X4LD213-1
1X4LD213-2	2X4LD213-2
AX4LD215	
AX4LD235	

Components Subject to an AMR

Portable fire protection equipment, such as fire hoses, fire extinguishers, CO_2 bottles, and self-contained breathing apparatus air bottles, is not subject to an aging management review because it is considered short-lived, replaced on condition, and exempted from aging management review consistent with the treatment of consumables described in Section 4.1.2 of NEI 95-10.

Flexible hoses installed on the diesel fire pump fuel oil lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.19 Fire Protection Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Fire Hydrants	Pressure Boundary
3	Flame Arrestor Elements	Flame Arresting
4	Flame Arrestor Housings	Pressure Boundary

Table 2.3.3.19 Fire Protection Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
5	Flexible Connectors	Pressure Boundary
6	Flow Orifice / Elements	Flow Restriction Pressure Boundary
7	Fusible Links & Sprinkler Head Bulbs	Pressure Boundary
8	Hose Station Nozzles and Hose Connections	Pressure Boundary
9	Hose Stations	Pressure Boundary
10	Piping Components	Pressure Boundary
11	Pump Casings - Fire Pumps (diesel-driven, motor-driven, and jockey pumps)	Pressure Boundary
12	Sight Glasses	Pressure Boundary
13	Silencers	Pressure Boundary
14	Spray Shields	Flow Direction
15	Sprinkler Heads and Spray Nozzles	Flow Distribution Pressure Boundary
16	Strainer Elements	Debris Protection
17	Strainer Housings	Pressure Boundary
18	Tanks - F.O. Storage Tanks (Fire Pump Diesel)	Pressure Boundary
19	Tanks - FP Water Storage Tanks	Pressure Boundary
20	Valve Bodies	Pressure Boundary

2.3.3.20 Emergency Diesel Generator System (2403)

System Description

The Emergency Diesel Generator (EDG) System, consisting of one diesel generator per safety-related load group complete with its accessories and fuel storage and transfer systems, generates onsite electric power to feed the Standby Power System. The Standby Power System provides AC power for safe shutdown of the plant in the event of loss of offsite power. There are two emergency diesel generators per unit. Each diesel generator is connected exclusively to a single 4.16-kV safety feature bus of a load group. Each VEGP unit has two 4.16-kV Class 1E trains, and the safety-related equipment on both trains is similar. The trains are redundant, and, for each unit, one train is adequate to satisfy minimum engineered safety features demand caused by a LOCA and a simultaneous loss of preferred power supply. The fuel oil storage for each unit is sized for 7 days of operation to meet the engineered safety feature load plus an additional amount for periodic testing of the diesel generator. The EDG support systems provide stored energy for starting the EDGs, along with cooling, lubrication, and combustion air intake and exhaust to allow the EDGs to perform their function as described above. The cooling water to the EDG jacket water coolers is supplied from the VEGP Nuclear Service Cooling Water System.

Scope Determination Summary

The EDG System provides Class 1E assured AC power for accident mitigation and safe shutdown. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with the EDG System is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

The emergency diesel generators provide emergency power if needed for performing safe shutdown in the event of a fire; it is listed on the Fire Event Safe Shutdown Systems/Components table. For SBO, startup of the emergency diesel generators to recover from an SBO event using onsite power is relied upon to terminate the event. Also, the emergency diesel generator reliability is an input in determining the VEGP SBO coping duration. Therefore, this system meets the 10 CFR 54.4(a)(3) criterion for SBO and for fire protection.

The following 10 CFR 54.4 criteria are met by the Emergency Diesel Generator System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X		

VEGP UFSAR References

The EDGs are described in VEGP UFSAR Section 8.3.1.1.3, Standby Power Supply. EDG support systems are described in VEGP UFSAR Sections 9.5.4 through 9.5.8.

License Renewal Drawings

1X4LD170-1
1X4LD170-2
AX4LD195-5
2X4LD170-1
2X4LD170-2

Components Subject to an AMR

Flexible hoses installed on the emergency diesel generator fuel oil lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.20 Emergency Diesel Generator System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Air Receivers	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Collection Troughs (EDG Lube Oil Leakage)	Pressure Boundary
4	Eductors - EDG F.O. Ejector Ass'y	Pressure Boundary
5	Electric Heater Housings	Pressure Boundary
6	Filter Housings	Pressure Boundary
7	Flame Arrestor Elements	Flame Arresting
8	Flame Arrestor Housings	Pressure Boundary

Table 2.3.3.20 (Cont'd) Emergency Diesel Generator System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
9	Flexible Connectors	Pressure Boundary
10	Flow Orifice / Elements	Flow Restriction Pressure Boundary
11	Heat Exchangers - EDG Jacket Water HXs (Channel Heads)	Pressure Boundary
12	Heat Exchangers - EDG Jacket Water HXs (Shells)	Pressure Boundary
13	Heat Exchangers - EDG Jacket Water HXs (Tubes)	Exchange Heat Pressure Boundary
14	Heat Exchangers - EDG Jacket Water HXs (Tubesheets)	Pressure Boundary
15	Heat Exchangers - EDG Lube Oil HXs (Channel Heads)	Pressure Boundary
16	Heat Exchangers - EDG Lube Oil HXs (Shells)	Pressure Boundary
17	Heat Exchangers - EDG Lube Oil HXs (Tubes)	Exchange Heat Pressure Boundary
18	Heat Exchangers - EDG Lube Oil HXs (Tubesheets)	Pressure Boundary
19	Oil Reservoirs - EDG Lube Oil Sumps	Pressure Boundary
20	Piping Components	Pressure Boundary
21	Pump Casings - EDG F.O. Engine-Driven Pumps	Pressure Boundary
22	Pump Casings - EDG F.O. Storage Tank Pumps	Pressure Boundary
23	Pump Casings - EDG Jacket Water Chem Add'n Pumps	Pressure Boundary
24	Pump Casings - EDG Jacket Water Keep Warm Pumps	Pressure Boundary
25	Pump Casings - EDG Jacket Water Pumps	Pressure Boundary

Table 2.3.3.20 (Cont'd) Emergency Diesel Generator System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
26	Pump Casings - EDG Lube Oil Keep Warm Pumps	Pressure Boundary
27	Pump Casings - EDG Lube Oil Pumps	Pressure Boundary
28	Silencers	Pressure Boundary
29	Strainer Elements	Debris Protection
30	Strainer Housings	Pressure Boundary
31	Tanks - EDG F.O. Day Tanks	Pressure Boundary
32	Tanks - EDG F.O. Line Leakage Tanks	Pressure Boundary
33	Tanks - EDG F.O. Storage Tanks	Pressure Boundary
34	Tanks - EDG Jacket Water Chem Add Tanks	Pressure Boundary
35	Valve Bodies	Pressure Boundary
36	Vent Screens - Tank Vents	Debris Protection

2.3.3.21 Demineralized Water System (1418)

System Description

The Demineralized Water (DW) System stores and delivers deionized water to various plant systems.

Demineralized water makeup/supply is not required for performance of any safety-related function.

Scope Determination Summary

The DW System includes some containment isolation valves and associated piping. Therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with the DW System is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Demineralized Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The Demineralized Water Makeup System is described in VEGP UFSAR Section 9.2.3, Demineralized Water Makeup System.

License Renewal Drawings

AX4LD190-2
1X4LD117
1X4LD130
1X4LD136
1X4LD138-1
1X4LD140-1
1X4LD141
1X4LD148
1X4LD170-1
1X4LD170-2
1X4LD179-2
1X4LD184
1X4LD221
2X4LD110
2X4LD117
2X4LD130
2X4LD136
2X4LD138-1
2X4LD140-1
2X4LD141
2X4LD148
2X4LD170-1
2X4LD170-2
2X4LD179-2
2X4LD184
2X4LD221

Components Subject to an AMR

Table 2.3.3.21 Demineralized Water System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Pressure Boundary
3	Piping Components	Pressure Boundary
4	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
5	Pump Casings - Demin Wtr Transfer Booster Pumps	Pressure Boundary
6	Valve Bodies	Pressure Boundary

2.3.3.22 Hydrogen Recombiner and Monitoring System (1513)

System Description

The Hydrogen Recombiner and Monitoring System was installed for post-accident containment hydrogen monitoring and control. SNC has the intent to downgrade the recombiners to nonsafety-related and to abandon them in place. The hydrogen monitors will also be downgraded to nonsafety-related; however, piping associated with these monitors penetrates containment and therefore has a containment integrity safety function. Until these CLB changes are processed, these components are considered to be within the scope of license renewal as safety-related.

Scope Determination Summary

The Hydrogen Recombiner and Monitoring System includes some containment isolation valves and associated piping, and the hydrogen recombiners and monitors are currently classified as safety-related in the CLB. Therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Hydrogen Recombiner and Monitoring System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X		X				

VEGP UFSAR References

The Hydrogen Recombiner and Monitoring System is discussed in VEGP UFSAR Section 6.2.5, Combustible Gas Control In Containment.

License Renewal Drawings

1X4LD213-2   2X4LD213-2

Components Subject to an AMR

Flexible hoses installed on the Containment Hydrogen Monitor calibration gas and oxygen supply lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.22 Hydrogen Recombiner and Monitoring System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Hydrogen Recombiner (CTMT) Housings	Flow Direction
3	Piping Components	Pressure Boundary
4	Valve Bodies	Pressure Boundary

2.3.3.23 Drain Systems

Drains within the scope of license renewal are associated with the following systems:

- Containment and Auxiliary Building Drain System – Radioactive (1214)
- Auxiliary Building Drain System – Nonradioactive (1215)
- Auxiliary Building Flood-Retaining Rooms, Alarms, & Drains (1218)
- Control Building Drain System (1225)
- Fuel Handling Building Drains (1227)
- Sanitary Waste and Vent (1406)
- Turbine Building Drain System (2412)

The Drain Systems consist of collection piping, valves, equipment drains, floor drains, vents, seals, cleanouts, oil and sediment interceptors, acid neutralization tanks, collection sumps, sump pumps, and collection tanks with associated discharge pumps, piping, and valves.

Containment and Auxiliary Building Drain System - Radioactive

System Description

The Containment and Auxiliary Building Drain System - Radioactive is designed to drain water in the Containment Building and tritiated water in the other buildings. Water drained into the system will enter the plant Liquid Waste Processing System for recycling or disposal.

Scope Determination Summary

The Containment and Auxiliary Building Drain System - Radioactive has some containment isolation valves and associated piping; therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Piping and valves in this system are required to maintain the negative pressure boundary in the Auxiliary Building (thereby ensuring that off-site doses remain a small fraction of the Part 100 limits) during certain loss of coolant accidents. Also, certain nonsafety-related piping associated with the Containment and Auxiliary Building Drain System - Radioactive is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Containment and Auxiliary Building Drain System - Radioactive						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Auxiliary Building Drain System – Nonradioactive

System Description

The Auxiliary Building Drain System – Nonradioactive drains normally nonradioactive equipment and floor liquid waste from open areas of the Auxiliary Building to the floor drain tank via the auxiliary building sump or the penetration room sump. This system also includes miscellaneous drains that convey fluids to other sumps and empty or drain the sumps.

Scope Determination Summary

Piping and valves in this system are required to maintain the negative pressure boundary in the Auxiliary Building (thereby ensuring that off-site doses remain a small fraction of the Part 100 limits) during certain loss of coolant accidents. Also, certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Auxiliary Building Drain System - Nonradioactive						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Auxiliary Building Flood-Retaining Rooms, Alarms, and Drain System

System Description

The Auxiliary Building Flood-Retaining Rooms, Alarms, and Drain System (FRRADS) prevents drain or flood water from backing up into selected important Auxiliary Building rooms. The FRRADS retains post-LOCA radioactive liquid leakage within the flood-retaining rooms. This function is accomplished by the water tight design of the room up to the maximum expected flood level and by the use of water tight doors which are assessed as part of Component Supports and Bulk Commodities, Section 2.4.12.

Scope Determination Summary

Some of the FRRADS flooding/leak detection instrumentation is safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Piping and valves in this system are required to maintain the negative pressure boundary in the Auxiliary Building (thereby ensuring that off-site doses remain a small fraction of the Part 100 limits) during certain loss of coolant accidents. Piping and valves in this system are required to maintain the flood-retaining room boundaries to prevent flooding of ESF equipment. Also, certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Auxiliary Building Flood-Retaining Rooms, Alarms, and Drains System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Control Building Drain System

System Description

The Control Building Drain System collects water from fire protection sprinklers in the Control Building, Equipment Building, Technical Support Center, and attached electrical tunnels as well as from incidental leaks. The system routes water to a sump below the Control Building. Sump pumps transfer the water to the Turbine Building oil separator. The system also provides an alternate route to the waste monitor tank in the Auxiliary Building for processing radioactive liquid.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Control Building Drain System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Fuel Handling Building Drainage System

System Description

The Fuel Handling Building Drainage System collects water in the Fuel Handling Building drain sump from drains within the building. Fuel Handling Building drain sump pumps transfer water from the building's drain sump to the waste monitor tank for processing or disposal.

Scope Determination Summary

Piping and valves in this system are required to maintain the negative pressure boundary in the Auxiliary Building (thereby ensuring that off-site doses remain a small fraction of the Part 100 limits) during certain loss of coolant accidents. Also, certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Fuel Handling Building Drainage System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

<u>Sanitary Waste and Vent System</u>

System Description

The Sanitary Waste and Vent System provides plumbing drains and vents for men's and women's toilets, locker rooms, showers, and janitor rooms in the Control and Turbine Buildings.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Sanitary Waste and Vent System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Turbine Building Drain System

System Description

The Turbine Building Drain System removes all liquid wastes from the Turbine Building before disposal to the Waste Water Effluent System. The Turbine Building Drain System also monitors and, if necessary, removes radioactive contaminants from these wastes should radioactive material appear in the drains due to a tube leak in one of the steam generators. Filters and demineralizers used to remove radioactive contaminants from wastes processed by this system are located in the Auxiliary Building.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Turbine Building Drain System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

Liquid Waste and Drains Systems are discussed in VEGP UFSAR Section 9.3.3, Equipment and Floor Drainage Systems, and VEGP UFSAR Section 11.2, Liquid Waste Management Systems.

License Renewal Drawings

1X4LD124	2X4LD124
1X4LD126	2X4LD126
1X4LD132	2X4LD132
1X4LD133-1	2X4LD133-1
1X4LD133-2	2X4LD133-2
1X4LD136	2X4LD136
1X4LD142-1	2X4LD142-1
1X4LD142-2	2X4LD142-2
1X4LD143	2X4LD143
1X4LD144-1	2X4LD144-1
1X4LD144-2	2X4LD144-2
1X4LD145-1	2X4LD145-1
1X4LD145-2	2X4LD145-2
1X4LD145-3	2X4LD145-3
1X4LD145-4	2X4LD145-4
1X4LD145-5	2X4LD145-5
1X4LD145-6	2X4LD145-6
1X4LD145-7	2X4LD145-7
1X4LD146-1	2X4LD146-1
1X4LD146-2	2X4LD146-2
1X4LD146-3	2X4LD146-3
1X4LD147-1	2X4LD147-1
1X4LD147-2	2X4LD147-2
1X4LD179-2	2X4LD179-2
1X4LD180-1	2X4LD180-1
1X4LD180-2	2X4LD180-2
1X4LD183	2X4LD183
1X4LD212	2X4LD212

Components Subject to an AMR

Flexible hoses installed on the Containment Building Tendon Gallery Sump Pump discharge lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.23 Drain Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Drain Bodies	Pressure Boundary
3	Floor Drain Plugs	Pressure Boundary
4	Piping Components	Pressure Boundary
5	Pump Casings - CCW Drain Tank Pumps	Pressure Boundary
6	Tanks - Acid Neutralizing Sumps	Pressure Boundary
7	Valve Bodies	Pressure Boundary

2.3.3.24 Potable and Utility Water Systems

The Potable and Utility Water LRA System consists of the following VEGP systems:

- Potable Water System (2417)
- Utility Water System (2419)

System Description

The Potable Water System receives and chemically treats well water and stores and distributes drinking water to the units.

The Utility Water System provides water for general washdown purposes at utility stations throughout the plant (nonradioactive process areas). Utility water also serves for sump pump bearing lubrication and miscellaneous cooling purposes, such as cooling of the steam generator blowdown samples.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Potable and Utility Water System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Potable Water System is discussed in VEGP UFSAR Section 9.2.4, Potable and Sanitary Water System. The Utility Water System is listed in VEGP UFSAR Table 3.2.2-1, Sheet 53.

License Renewal Drawings

1X4LD142-1
1X4LD164-2
1X4LD171-8
AX4LD198-2
AX4LD225
2X4LD142-1
2X4LD164-2
2X4LD171-8

Components Subject to an AMR

Table 2.3.3.24 Potable and Utility Water Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Arrestors (Water Hammer)	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Piping Components	Pressure Boundary
4	Pump Casings - Hot Water Recirculation Pumps	Pressure Boundary
5	Strainer Housings	Pressure Boundary
6	Valve Bodies	Pressure Boundary
7	Water Heater Housings and Jackets	Pressure Boundary Flow Direction

2.3.3.25 Radiation Monitoring System (1609)

System Description

The Radiation Monitoring System monitors the radiation levels in the process flow streams of certain plant fluid systems, measures direct gamma radiation for certain areas, and provides corresponding indications, recordings, alarms, and controls. For fluid systems normally containing radioactivity which have direct discharge paths or diluted discharge paths to the surrounding environment, the Radiation Monitoring System provides actuation functions to limit further discharge if activity concentrations exceed preset levels. The system also provides information used to detect and monitor RCS leakage.

Radiation monitors fall into five functional classifications:

- Process monitors, which determine concentrations of radioactive material in plant fluid systems. The primary-to-secondary leak detection monitors (N16 and noble gas leak rate detectors) are also included in this category;
- Effluent monitors, which measure radioactivity discharged to the environs;
- Airborne monitors, which provide operator information on airborne concentrations of radioactive gases and particulate radioactivity at various points in the ventilation ducts;
- Area monitors, which provide operator information on external gamma radiation levels at fixed points throughout the plant;
- Post-accident (or high range) monitors, designed to assess and follow potential pathways for release of radioactive materials during accident conditions.

The radiation monitors themselves (all types) are instrumentation components and therefore are addressed in the scoping and screening for the Electrical and Instrumentation and Controls Systems (Section 2.5). Mechanical aspects such as the process line components are addressed in the mechanical scoping and screening.

Scope Determination Summary

Certain radiation monitors are safety-related and provide actuation functions to limit further discharges if activity concentrations exceed preset levels. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain radiation monitors and nonsafety-related piping associated with this system have the potential to interact spatially with safety-related components, or are connected to (and provide support to) safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Radiation Monitoring System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Process and Area Radiation Monitoring Systems are discussed in VEGP UFSAR Section 11.5, Process and Effluent Radiological Monitoring Systems, and VEGP UFSAR Section 12.3.4, Area Radiation and Airborne Radioactivity Monitoring Instrumentation.

License Renewal Drawings

1X4LD115	2X4LD115
1X4LD133-1	2X4LD133-1
1X4LD133-2	2X4LD133-2
1X4LD136	2X4LD136
1X4LD138-1	2X4LD138-1
	2X4LD142-1
1X4LD159-2	2X4LD159-2
1X4LD179-1	2X4LD179-1
1X4LD179-2	2X4LD179-2
1X4LD203	2X4LD203
1X4LD205-2	
1X4LD213-2	2X4LD213-2
AX4LD204-2	
AX4LD206-1	
AX4LD206-3	

Components Subject to an AMR

Flexible hoses installed on the plant vent stack radiation monitor sample lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.3.25 Radiation Monitoring System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Piping Components	Pressure Boundary
3	Valve Bodies	Pressure Boundary

2.3.3.26 Reactor Makeup Water Storage System (1228)

System Description

The function of the Reactor Makeup Water Storage System is to supply recycled and deaerated demineralized water to a number of safety-related surge tanks. This system also furnishes water to the boric acid mixing tee for daily use as a dilutent to the RCS and to various gas strippers, pumps, tanks, and pipelines for cleaning and flushing operations. It provides an assured Seismic Category I make-up source to the spent fuel pool and an assured backup Seismic Category I makeup source to the component cooling water surge tanks and auxiliary component cooling water surge tanks. The Reactor Makeup Water Storage Tank (RMWST) degasifier is designed to recirculate and degasify the demineralized water to reduce the oxygen content to meet specifications for primary plant usage.

The Reactor Makeup Water Storage Tanks are constructed of concrete with a stainless steel liner. The tank liner is evaluated in this section as a mechanical component. The concrete shell, roof, and base slab are evaluated in the Structural scoping for the Concrete Tank and Valve House Structures, Section 2.4.7. The Reactor Makeup Water Storage Tanks are fitted with floating diaphragms which minimize oxygen absorption.

Scope Determination Summary

The RWMST provides a backup water supply to a number of safety-related components, and is safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

This system is classified as a system where failure of nonsafety-related components could directly impact a safety function. Also, certain nonsafety-related piping associated with the RMWST System is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. Therefore, this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Reactor Makeup Water Storage System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The Reactor Makeup Water Storage Tank and Degasifier Facility is discussed in VEGP UFSAR Section 9.2.7, Reactor Makeup Water Facility.

License Renewal Drawings

1X4LD112	2X4LD112
1X4LD115	2X4LD115
1X4LD116-1	2X4LD116-1
1X4LD117	2X4LD117
1X4LD118	
AX4LD123-2	
1X4LD125	2X4LD125
1X4LD128	2X4LD128
1X4LD129	2X4LD129
1X4LD130	2X4LD130
1X4LD136	2X4LD136
1X4LD138-1	2X4LD138-1
1X4LD183	
1X4LD184	2X4LD184
1X4LD221	2X4LD221

Components Subject to an AMR

Table 2.3.3.26 lists the components subject to aging management review and their intended functions.

Table 2.3.3.26 Reactor Makeup Water Storage System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Piping Components	Pressure Boundary
4	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
5	Pump Casings - Rx Make-up Wtr Pumps	Pressure Boundary
6	Tank Diaphragms - RMWSTs	Physical Integrity
7	Tank Liners (& internals) - RMWST Liners	Pressure Boundary
8	Valve Bodies	Pressure Boundary

2.3.3.27 Sampling Systems

The Sampling Systems are made up of the following VEGP systems:

- Nuclear Sampling System – Liquids (1212)
- Nuclear Sampling System – Gaseous (1211)
- Turbine Plant Sampling System (1311)
- Post-Accident Sampling System (2702)

Nuclear Sampling System - Liquids

System Description

The function of the Nuclear Sampling System – Liquids is to supply representative samples of process liquids to the laboratory for analysis, thereby providing guidance in the operation of the Reactor Coolant System, Residual Heat Removal System, Safety Injection System, Waste Processing System, and Chemical and Volume Control System. The Nuclear Sampling System – Liquids is designed for manual operation and has no emergency function; however, certain valves in the system have a containment isolation function, and lines which penetrate containment are relied upon for containment integrity.

Scope Determination Summary

Certain valves and associated piping associated with the Nuclear Sampling System – Liquids provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Nuclear Sampling System - Liquids						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Nuclear Sampling System - Gaseous

System Description

The function of the Nuclear Sampling System – Gaseous is to provide representative process stream gas samples for the laboratory analysis from the Gaseous Waste, Boron Recycle, and CVCS Systems as required to support plant operation. The Nuclear Sampling System – Gaseous is designed to be manually operated only during periods of normal plant operation.

Scope Determination Summary

A valve common to both units is relied upon to prevent gaseous releases in excess of 10 CFR Part 100 limits and is considered safety-related. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is connected to (and provides support to) safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Nuclear Sampling System - Gaseous						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

Turbine Plant Sampling System

System Description

The function of the Turbine Plant Sampling System is to collect, cool, analyze, control, alarm, and record water quality from various sampling points in the secondary plant systems. The system monitors water samples from the steam generator blowdown lines, the turbine cycle and the Circulating Water System to control water chemistry and permit appropriate corrective action by operators.

Scope Determination Summary

Certain valves and associated piping in this system provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system has the potential for spatial interaction with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain equipment in this system is credited to support mitigation of the SBO event, such as steam generator sample line isolation. Therefore the system meets the 10 CFR 54.4(a)(3) criterion for SBO.

The following 10 CFR 54.4 criteria are met by the Turbine Plant Sampling System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X			

<u>Post-Accident Sampling System (PASS)</u>

System Description

The Post-Accident Sampling System (PASS) provides the capability to take and return a post-accident containment atmosphere sample via PASS piping and skid-mounted equipment. The original design of the PASS included the capability to obtain fluid samples from the Reactor Coolant System and the containment sumps. That capability has been eliminated. Post-accident fluid samples from the Reactor Coolant System and the containment sumps can be obtained utilizing the Nuclear Sampling System – Liquids. Certain lines and valves associated with this system are relied upon for containment isolation and integrity.

Scope Determination Summary

Certain valves and associated piping in this system provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is either connected to (and provides support to) or has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Post-Accident Sampling System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Sampling Systems are discussed in VEGP UFSAR Section 9.3.2, Process Sampling Systems.

License Renewal Drawings

1X4LD110	2X4LD110
1X4LD115	2X4LD115
1X4LD116-1	2X4LD116-1
AX4LD123-1	
	2X4LD128
1X4LD139	2X4LD139
1X4LD140-1	2X4LD140-1
1X4LD141	
1X4LD151-2	2X4LD151-2
1X4LD159-1	2X4LD159-1
1X4LD159-2	2X4LD159-2
1X4LD159-3	2X4LD159-3
1X4LD171-8	2X4LD171-8
1X4LD179-1	2X4LD179-1
1X4LD179-2	2X4LD179-2

Components Subject to an AMR

Table 2.3.3.27 Sampling Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Corrosion Product Monitors (Shells and Heads)	Pressure Boundary
3	Filter Housings	Pressure Boundary
4	Flow Orifice / Elements	Flow Restriction Pressure Boundary
5	Piping Components	Pressure Boundary
6	Pump Casings - SGBD Sample Pumps	Pressure Boundary
7	Rotameter Housings	Pressure Boundary
8	Sample Baths - Steam Generator Blowdown Bath (Shells)	Pressure Boundary
9	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary
10	Strainer Housings	Pressure Boundary
11	Valve Bodies	Pressure Boundary

2.3.3.28 Auxiliary Gas Systems

The Auxiliary Gas Systems include the following VEGP systems:

- Auxiliary Gas System – Nitrogen (2402)
- Auxiliary Gas System – Hydrogen (2406)

Auxiliary Gas System – Nitrogen

System Description

The Auxiliary Gas System - Nitrogen supplies nitrogen for pressurizing, blanketing, and purging of various plant components.

Scope Determination Summary

Certain valves and associated piping in this system provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is connected to (and provides support to) safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Auxiliary Gas System - Nitrogen						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Auxiliary Gas System - Hydrogen

System Description

The Auxiliary Gas System - Hydrogen supplies hydrogen to the generator for cooling, to the Chemical and Volume Control System (CVCS) for oxygen scavenging, and to the waste gas decay tanks and the reactor coolant drain tanks.

Scope Determination Summary

Leakage of hydrogen could result in an explosive gas mixture. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Auxiliary Gas System - Hydrogen						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Auxiliary Gas Systems are discussed in VEGP UFSAR Section 9.3.5, Auxiliary Gas Systems

License Renewal Drawings

1X4LD112
1X4LD116-1
1X4LD120
1X4LD127
1X4LD128
1X4LD159-1
1X4LD159-3
1X4LD176-3
1X4LD179-2

2X4LD112
2X4LD116-1
2X4LD120
2X4LD127
2X4LD128
2X4LD159-1
2X4LD159-3
2X4LD176-3
2X4LD179-2

Components Subject to an AMR

Table 2.3.3.28 Auxiliary Gas Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Piping Components	Pressure Boundary
3	Valve Bodies	Pressure Boundary

2.3.3.29 Chilled Water Systems

The Chilled Water Systems are made up of the following VEGP systems:

- Normal Chilled Water System (1591)
- Essential Chilled Water System (1592)
- Special Chilled Water System (1564)

Normal Chilled Water System

System Description

The Normal Chilled Water System provides chilled water throughout the plant to all air-conditioning and air cooling units that are required during normal plant operation. Each unit's system can also be connected to provide chilled water for use in one containment building auxiliary air cooling unit and one reactor cavity cooling unit during refueling outages.

Scope Determination Summary

Piping in this system has the potential for spatial interaction with safety-related components. Therefore this system is within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Normal Chilled Water System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Essential Chilled Water System

System Description

The Essential Chilled Water System provides chilled water to the cooling coils of the various engineered safety features (ESF) rooms or areas including the battery rooms, switchgear rooms, control rooms, ESF pump rooms, penetration areas, and the spent fuel pool heat exchanger and pump rooms. Both trains of essential chilled water are automatically actuated on either a safety injection signal or control room isolation signal. However, on a loss of offsite power, the system is manually actuated. Each essential chilled water train is powered by the emergency bus associated with the equipment it cools.

Scope Determination Summary

This system is credited for accident mitigation and safe shutdown, and is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Equipment associated with this system is listed on the Fire Event Safe Shutdown Systems/Components table. Therefore the system meets the 10 CFR 54.4(a)(3) criterion for fire protection.

The following 10 CFR 54.4 criteria are met by the Essential Chilled Water System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

Special Chilled Water System

System Description

The Special Chilled Water System provides the necessary cooling water to the air-cooling systems for the onsite Technical Support Center and the standby Central Alarm Station.

Scope Determination Summary

Certain nonsafety-related piping associated with this system is either connected to (and provides support to) or has the potential to interact spatially with safety-related components. Therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Special Chilled Water System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Chilled Water Systems are discussed in VEGP UFSAR Section 9.2.9, Chilled Water Systems and in VEGP UFSAR Table 3.2.2-1, Classification of Structures, Components and Systems.

License Renewal Drawings

1X4LD135-2	2X4LD135-2
1X4LD221	2X4LD221
AX4LD231	
AX4LD232	
1X4LD233	2X4LD233
1X4LD234	2X4LD234
AX4LD242-2	

Components Subject to an AMR

Table 2.3.3.29 Chilled Water Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Air Separator	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Electric Heater Housings	Pressure Boundary
4	Essential Chillers - Condenser (Channel Heads)	Pressure Boundary
5	Essential Chillers - Condenser (Shells)	Pressure Boundary
6	Essential Chillers - Condenser (Tubes)	Exchange Heat Pressure Boundary
7	Essential Chillers - Condenser (Tubesheets)	Pressure Boundary
8	Essential Chillers - Evaporator (Channel Heads)	Pressure Boundary
9	Essential Chillers - Evaporator (Shells)	Pressure Boundary
10	Essential Chillers - Evaporator (Tubes)	Exchange Heat Pressure Boundary
11	Essential Chillers - Evaporator (Tubesheets)	Pressure Boundary
12	Flow Orifice / Elements	Flow Restriction Pressure Boundary
13	Oil Reservoirs - Chiller Compressors	Pressure Boundary
14	Piping Components	Pressure Boundary
15	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary

Table 2.3.3.29 (Cont'd) Chilled Water System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
16	Pump Casings - Chilled Water Pumps	Pressure Boundary
17	Pump Casings - Chiller Motor Driven Oil Pumps	Pressure Boundary
18	Sight Glasses	Pressure Boundary
19	Strainer Elements	Debris Protection
20	Strainer Housings	Pressure Boundary
21	Tanks - Chilled Water Chemical Feed Pots	Pressure Boundary
22	Tanks - Chilled Water Expansion Tanks	Pressure Boundary
23	Tanks - Chiller Economizers	Pressure Boundary
24	Valve Bodies	Pressure Boundary

2.3.3.30 Waste Management Systems

The VEGP Waste Management Systems include the following systems:

- Backflushable Filter System (1224)
- Condensate Cleanup System (1414)
- Waste Processing System, Liquid (1901)
- Waste Processing System, Gas (1902)

Backflushable Filter System

System Description

The Backflushable Filter System consists of two major subsystems which function to filter and transport radioactive crud:

1. Backflushable filters subsystem for filtering crud during normal operation in the Chemical and Volume Control System, Boron Recycle System, Liquid Waste Processing System, Spent Fuel Cooling and Purification System and Steam Generator Blowdown System.

2. Crud collection subsystem which consists of a backflushable filter crud tank (equipped with a sprayball) and two crud tank pumps which function to collect and transport the crud solution to the Radwaste Solidification System or Alternate Radwaste Building for disposal.

The Backflushable Filter System is nonsafety-related, used intermittently only during infrequent filter backflushing operations, and remains isolated most of the time.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Backflushable Filter System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Condensate Cleanup System

System Description

The Condensate Cleanup System maintains the required purity of feedwater for the steam generators by filtration to remove corrosion products and/or ion exchange to remove condenser leakage impurities.

The Condensate Cleanup System consists of the Condensate Filter Demineralizer System, the Backwash Recovery System, the Spent Resin Disposal System, and the Spent Resin Dewatering System. The Backwash Recovery System, the Spent Resin Disposal System, and the Spent Resin Dewatering System have all been retired in place.

The Condensate Polishing System has been included in the Condensate Cleanup System. The function of the Condensate Polishing System (full-flow condensate filter/demineralizers) is to filter suspended corrosion products from the condensate and remove ionic contaminants in order to minimize localized corrosion in the steam generators, turbine, and feedwater systems.

Scope Determination Summary

Certain nonsafety-related piping associated with this system has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Condensate Cleanup System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

Waste Processing System, Liquid

System Description

The Waste Processing System, Liquid, is designed to control, collect, process, handle, store, and dispose of liquid radioactive waste generated as the result of normal operation, including anticipated operational occurrences. This system contains three subsystems that perform different activities, as follows:

The recycle subsystem processes reactor grade water which enters the system via equipment leaks and drains, valve leakoffs, pump seal leakoffs, tank overflows, and other tritiated water sources, and makes this water available for reuse in the plant.

The liquid waste subsystem collects and processes nonreactor grade liquid wastes, including wastes from floor drains, equipment drains containing nonreactor grade sources, laundry and hot shower drains, spent and excess radioactive samples, and other nonreactor grade sources.

The spent resin collection subsystem transports spent resin to the spent resin storage tank.

Scope Determination Summary

Certain piping and valves associated with this system provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is either connected to (and provides support to) or has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

Certain electrical equipment associated with this system is listed on the 10 CFR 50.49 EQ Master List; therefore this system meets the 10 CFR 54.4(a)(3) criterion for EQ.

The following 10 CFR 54.4 criteria are met by the Waste Processing System, Liquid						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

Waste Processing System, Gas

System Description

The Waste Processing System, Gas, is designed to remove fission product gases from the Reactor Coolant System in the Volume Control Tank, the Boron Recycle System, the Reactor Coolant Drain Tank, and the Liquid Waste Processing System. The Waste Processing System, Gas, has a long-term storage capacity for fission product gases which eliminates the need for scheduled discharges of radioactive gases.

The Waste Processing System, Gas, performs no function related to the safe shutdown of the plant. However, the system is designed to distribute the stored activity inventory, so that in the event of a waste gas decay tank failure, the dose will be a fraction of the permissible limit set forth in 10 CFR 100. The curie content of each waste gas decay tank is individually limited in accordance with the Technical Requirements Manual. Hence, the waste gas decay tanks are safety-related. The tanks and the piping and valves out to the first isolation valve are safety-related, and the safety-related portion also includes the common piping header for the discharge of the pressure relief valves for the tanks.

In addition, a safety-related interface allows the CLB to consider a Waste Processing System, Gas, release and a Recycle Hold-Up Tank gaseous release separately. Without the safety-related interface, the two releases would have to be considered concurrently. Therefore, the interface components serve a function to mitigate the consequences of an accident and are in scope.

Scope Determination Summary

This system provides a safety-related function related to 10 CFR Part 100 Limits. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Certain nonsafety-related piping associated with this system is either connected to (and provides support to) or has the potential to interact spatially with safety-related components; therefore this system meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Waste Processing System, Gas						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The Waste Management Systems are discussed in the following UFSAR sections:

- Backflushable Filter System – VEGP UFSAR Section 11.4.2.3.2
- Condensate Cleanup System – VEGP UFSAR Section 10.4.6
- Waste Processing System, Liquid – VEGP UFSAR Section 11.2
- Waste Processing System, Gas – VEGP UFSAR Section 11.3

License Renewal Drawings

1X4LD111	2X4LD111
1X4LD115	2X4LD115
1X4LD117	2X4LD117
AX4LD123-1	
AX4LD123-2	
1X4LD124	2X4LD124
1X4LD125	2X4LD125
1X4LD126	2X4LD126
1X4LD127	2X4LD127
1X4LD128	2X4LD128
1X4LD129	2X4LD129
1X4LD130	2X4LD130
1X4LD141	
1X4LD148	2X4LD148
1X4LD148-1	2X4LD148-1
1X4LD148-2	2X4LD148-2
1X4LD148-3	2X4LD148-3
1X4LD148-4	2X4LD148-4
AX4LD148-7	
1X4LD148-9	2X4LD148-9
1X4LD148-11	2X4LD148-11
	2X4LD148-13
1X4LD184	2X4LD184
1X4LD185-5	2X4LD185-5

Components Subject to an AMR

Table 2.3.3.30 Waste Management Systems Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Accumulators	Pressure Boundary
2	Closure Bolting	Pressure Boundary
3	Equipment Frames - Catalytic H2 Recombiner Skid	Pressure Boundary
4	Equipment Frames - Waste Gas Compressor Skid	Pressure Boundary
5	Filter Housings	Pressure Boundary
6	Flow Orifice / Elements	Pressure Boundary
7	Gas Traps	Pressure Boundary
8	Piping Components	Pressure Boundary
9	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
10	Pump Casings - Gas Decay Drain Pumps	Pressure Boundary
11	Tanks - Backflushable Filter Crud Tanks	Pressure Boundary
12	Tanks - Waste Gas Decay Shutdown Tanks	Pressure Boundary
13	Tanks - Waste Gas Decay Tanks	Pressure Boundary
14	Valve Bodies	Pressure Boundary

2.3.3.31 Thermal Insulation (1105)

System Description

Thermal insulation minimizes heat loss from components and provides personnel protection from high temperature components. Insulation located in areas with safety-related equipment is designed to retain structural integrity during and after a Seismic Category 1 event. The insulation support structures for the reactor vessel and nozzles are designed to limit the amount of insulation displaced by blowdown during a LOCA condition below the amount assumed for the reactor cavity pressurization analysis. Inside the containment, insulation on components with high operating temperatures is credited in the Containment Cooling System design.

Thermal insulation located outside containment has no safety design basis. However, insulation located in areas with safety-related equipment is designed to retain structural integrity during and after a seismic event.

Insulation on piping at containment penetrations is required to keep local concrete temperatures below 200 °F. For certain HVAC systems, insulation is credited in the heat load calculations that assure the HVAC systems will perform their safety-related functions. Exhaust pipe insulation for the EDGs (including the silencers), is credited in the EDG Building heat-up calculation.

Outside area insulation in conjunction with heat tracing provides freeze protection for small bore piping and instrument lines for in-scope systems. Also, insulation supports heat tracing and for certain lines in the battery rooms acts as a spray shield.

Scope Determination Summary

Thermal insulation inside containment is required to maintain integrity to avoid clogging sump screens. Some insulation provides freeze protection for safety-related systems. Insulation on piping in containment penetrations is required to keep local concrete temperatures below 200 °F. For certain HVAC systems, insulation is credited in the calculations that assure the HVAC systems will perform their safety-related functions. Thermal insulation is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Some room temperatures were determined to be acceptable for SBO based on the thermal insulation; therefore, thermal insulation is in scope for SBO based on the 10 CFR 54.4(a)(3) criterion. .

The following 10 CFR 54.4 criteria are met by the Thermal Insulation						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X		X			

VEGP UFSAR References

Thermal Insulation is discussed in the following UFSAR sections: VEGP UFSAR Section 5.2.3.2.3 and VEGP UFSAR Section 6.2.1.2.1.2.

License Renewal Drawings

None

Components Subject to an AMR

Table 2.3.3.31 Thermal Insulation Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Insulation - Jacketing and Supports	Structural Support Shelter / Protection
2	Thermal Insulation	Environmental Control Physical Integrity

2.3.3.32 Miscellaneous Leak Detection System (1222)

System Description

The Miscellaneous Leak Detection System identifies leaks in the containment bottom and side liners and in the liners of the spent fuel pool, fuel transfer canal, and fuel cask loading pit. This system also includes containment penetrations necessary to perform the periodically required containment integrated leak rate test.

Scope Determination Summary

Certain piping and valves associated with this system provide a containment isolation function. This system is therefore within the scope of license renewal based on the 10 CFR 54.4(a)(1) criterion.

Nonsafety-related piping for this system is attached to and provides support to safety-related containment penetrations. This system therefore meets the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Miscellaneous Leak Detection System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

VEGP UFSAR References

The characteristics of the Miscellaneous Leak Detection System are shown in VEGP UFSAR Table 3.2.2-1 Sheet 53**.**

License Renewal Drawings

1X4LD132
1X4LD159-1
2X4LD132
2X4LD159-1

Components Subject to an AMR

Table 2.3.3.32 Miscellaneous Leak Detection System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Piping Components	Pressure Boundary
3	Valve Bodies	Pressure Boundary

2.3.4 STEAM AND POWER CONVERSION SYSTEMS

The Steam and Power Conversion Systems are described in the following sections:

- Main Steam System, Section 2.3.4.1
- Feedwater System, Section 2.3.4.2
- Steam Generator Blowdown System, Section 2.3.4.3
- Auxiliary Feedwater System, Section 2.3.4.4
- Auxiliary Steam System, Section 2.3.4.5
- Electrohydraulic Control System, Section 2.3.4.6

2.3.4.1 Main Steam System (1301)

System Description

The Main Steam System is integral to the Nuclear Steam Supply System (NSSS) heat removal systems and steam generator overpressure protection features. The Main Steam System conducts the steam generated in the four steam generators through the containment to the turbine-generator, moisture separator reheaters, steam jet air ejectors, turbine shaft gland seals, steam generator feedwater pump turbines, turbine-driven auxiliary feedwater pump, and the Turbine Bypass System.

Safety-related portions of the Main Steam System include the heat removal, overpressure protection, and isolation features. Steam is conducted from the steam generators to the atmospheric relief and main steam safety valves to remove heat from the RCS. The atmospheric relief and main steam safety valves protect the steam generator and the main steam piping from over pressurization. The outlet nozzle of each steam generator is provided with a flow restrictor designed to limit flowrate and thrust loads in the event of a main steam line rupture. The Main Steam System also supplies steam to the auxiliary feedwater pump turbine which provides feedwater to the steam generators for reactor heat removal during accident or transient conditions when normal feedwater is unavailable.

All four main steam lines are provided with two main steam isolation valves (MSIVs) and two main steam bypass valves to isolate the secondary side of the steam generators in the event of leakage or malfunction, to prevent the uncontrolled blowdown of the steam generators, and to isolate nonsafety-related portions of the system.

Scope Determination Summary

The Main Steam System is within the scope of license renewal based on the criterion of 10 CFR 54.4(a)(1) due to the requirements to remove heat from the Reactor Coolant System, provide over-pressure protection of the system and of the steam generator shell sides, supply steam to the turbine driven auxiliary feedwater pump, isolate non-faulted steam generators in the event of a secondary-side rupture, and to maintain containment integrity. Certain system components provide input to or receive input from the Reactor Protection System.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, is used to direct steam from the safety valve discharges to outside the building, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. Portions of the system are relied upon in analyses for coping with station blackout, fire events, and anticipated transient without scram events. SBO coping includes isolation and decay heat removal via the atmospheric relief valves. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Main Steam System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X	X	

VEGP UFSAR References

The Main Steam System is discussed in VEGP UFSAR Section 10.3, Main Steam Supply System

License Renewal Drawings

1X4LD159-1
1X4LD159-2
1X4LD159-3
1X4LD160-1
1X4LD160-2
1X4LD161-3
1X4LD194

2X4LD159-1
2X4LD159-2
2X4LD159-3
2X4LD160-1
2X4LD160-2
2X4LD161-3
2X4LD194

Components Subject to an AMR

Flexible hoses installed on the atmospheric relief valve hand pump unit discharge lines are not subject to an aging management review because they will be placed on a schedule for periodic replacement.

Table 2.3.4.1 Main Steam System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Filter Housings – ARV Local (Manual) Actuators	Pressure Boundary
3	Flexible Connectors	Pressure Boundary
4	Flow Orifice / Elements	Flow Restriction Pressure Boundary
5	Flow Restrictors - ARV Discharge Paths	Flow Restriction
6	Oil Reservoirs - ARV Local (Manual) Actuators	Pressure Boundary
7	Oil Reservoirs Filler/Breather Caps – ARV Local (Manual) Actuators	Pressure Boundary Debris Protection
8	Piping Components	Flow Direction * Pressure Boundary
9	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary
10	Pump Casings - ARV Manual Hand Pumps	Pressure Boundary
11	Pump Casings - Wet Layup Recirc Pumps	Pressure Boundary
12	Valve Bodies	Pressure Boundary

* Flow direction is for main steam safety and atmospheric relief valves discharge piping/vent stacks.

2.3.4.2 Feedwater System

The Feedwater LRA System includes the following VEGP systems:

- Condensate and Feedwater System (1305)
- Condensate Chemical Injection System (1411)
- Feedwater Heater and MSR Drain System (1304)

Condensate and Feedwater System

System Description

The Condensate and Feedwater System provides for the condensing of high-pressure & low-pressure turbine extraction & exhaust steam and main feedwater pump turbine exhaust steam, collects the condensate in the condenser hotwell, and maintains steam generator water level by supplying preheated feedwater through all power operation modes of the plant. The system also functions to isolate feedwater as required to limit mass and energy into containment in the event of feedwater break, prevents over cooling of the Reactor Coolant System, and prevent overfilling the steam generators (SGs) resulting in water in the steam lines. Feedwater flow is provided to each SG via a 16-inch main feedwater line to the SG main feedwater nozzle, or the 6-inch feedwater bypass line to the auxiliary feedwater nozzle. The portion of the feedwater bypass line from upstream of the feedwater bypass isolation valves to the steam generator bypass feedwater/auxiliary feedwater nozzle is shared with, and part of, the safety-related Auxiliary Feedwater (AFW) System.

Scope Determination Summary

The Condensate and Feedwater System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to minimize the effects of a secondary-side rupture, isolate non-faulted steam generators in the event of a secondary-side rupture, and maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. Portions of the system are evaluated in analyses for coping with anticipated transient without scram events. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Condensate and Feedwater System						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X			X	

Condensate Chemical Injection System

System Description

The primary function of the Condensate Chemical Injection System is to provide chemicals to the Condensate and Feedwater System for corrosion control. The Condensate Chemical Injection System includes the piping and storage/transfer equipment used to convey the chemicals and extends to the piping for the Condensate and Feedwater System, Auxiliary Feedwater System, and steam generators. The only safety functions of the system are containment isolation and integrity.

Scope Determination Summary

The Condensate Chemical Injection System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

The following 10 CFR 54.4 criteria are met by the Condensate Chemical Injection System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X					

Feedwater Heater and Moisture Separator/Reheater (MSR) Drain System

System Description

The Feedwater Heater and Moisture Separator/Reheater (MSR) Drain System drains the liquid (condensed steam) from the feedwater heaters and moisture separator/reheaters and routes these drains to the Condensate and Feedwater System. This system performs no safety function but is within the scope of license renewal due to 10 CFR 54.4(a)(2) requirements.

Scope Determination Summary

The Feedwater Heater and MSR Drain System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(2) because certain piping in this system is routed into safety related structures and has the potential for spatial interaction with safety-related components.

<table>
<tr><td colspan="7">The following 10 CFR 54.4 criteria are met by the Feedwater Heater and Moisture Separator/Reheater (MSR) Drain System:</td></tr>
<tr><td>(a)(1)</td><td>(a)(2)</td><td colspan="5">(a)(3)</td></tr>
<tr><td></td><td></td><td>EQ</td><td>SBO</td><td>FP</td><td>ATWS</td><td>PTS</td></tr>
<tr><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

VEGP UFSAR References

The Feedwater System is discussed in VEGP UFSAR Section 10.4.7, Condensate and Feedwater Systems. Chemical injection is discussed in VEGP UFSAR Section 10.3.5, Water Chemistry.

License Renewal Drawings

1X4LD159-1
1X4LD159-3
1X4LD161-1
1X4LD161-2
1X4LD168-3
1X4LD171-8
1X4LD179-1
1X4LD179-2

2X4LD159-1
2X4LD159-3
2X4LD161-1
2X4LD161-2
2X4LD168-3
2X4LD171-8
2X4LD179-1
2X4LD179-2

Components Subject to an AMR

Table 2.3.4.2 Feedwater System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Piping Components	Pressure Boundary
4	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary
5	Piping Components - Guard Pipe	Pressure Boundary
6	Valve Bodies	Pressure Boundary

2.3.4.3 Steam Generator Blowdown System (1407)

System Description

The Steam Generator Blowdown System accepts secondary water from each steam generator blowdown line, processes the water as may be required and delivers the processed water to either the Condensate System or to the Waste Water Retention Basin. Process steps include cooling with heat recovery, pressure reduction, filtration, and ion exchange. The purpose of the Steam Generator Blowdown System is to maintain optimum secondary side water chemistry during normal operation and during anticipated operational occurrences by removing impurities resulting from primary coolant or circulating water inleakage which are concentrated in the steam generator by the evaporative process.

Safety-related instrumentation in the Steam Generator Blowdown System is used to help detect and isolate high energy lines in the Auxiliary Building. Interfaces between the nonsafety-related portions of the Steam Generator Blowdown System and other plant systems can adversely affect safety-related portions of the plant following a postulated pipe rupture in the nonsafety-related high-energy portion of the system outside of containment.

Scope Determination Summary

The Steam Generator Blowdown System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) because instrumentation used to help detect and isolate high energy line breaks is classified as safety-related.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. These components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Steam Generator Blowdown System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X				

VEGP UFSAR References

The Steam Generator Blowdown System is discussed in VEGP UFSAR Section 10.4.8, Steam Generator Blowdown Processing System.

License Renewal Drawings

	2X4LD148-13
1X4LD159-1	2X4LD159-1
1X4LD159-3	2X4LD159-3
1X4LD179-1	2X4LD179-1
1X4LD179-2	2X4LD179-2
1X4LD180-2	2X4LD180-2

Components Subject to an AMR

Table 2.3.4.3 Steam Generator Blowdown System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Filter Housings	Pressure Boundary
3	Flow Orifice / Elements	Flow Restriction Pressure Boundary
4	Heat Exchangers - SGBD HXs (Channel Heads)	Pressure Boundary
5	Heat Exchangers - SGBD HXs (Shells)	Pressure Boundary
6	Heat Exchangers - SGBD Trim HXs (Channel Heads)	Pressure Boundary
7	Heat Exchangers - SGBD Trim HXs (Shells)	Pressure Boundary
8	Piping Components	Pressure Boundary
9	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
10	Pump Casings – Steam Generator Drain Pumps	Pressure Boundary
11	Pump Casings – Steam Generator Blowdown Spent Resin Sluice Pumps	Pressure Boundary
12	Strainer Housings	Pressure Boundary
13	Valve Bodies	Pressure Boundary

2.3.4.4 Auxiliary Feedwater System (1302)

System Description

The Auxiliary Feedwater (AFW) System is designed to supply feedwater to the steam generators (SGs) during start up, cooldown and emergency conditions resulting in a loss of main feedwater. The two motor-driven and one turbine-driven AFW pumps are available to ensure the required feedwater flow to the SGs is available. During normal operations, the system is in a standby mode, with controls selected for automatic operation.

The system capacity is sufficient to remove decay heat and to provide adequate feedwater for cooldown of the RCS within specified cooldown limits. The AFW System is relied upon as the source of feedwater supply to the SGs to maintain a secondary heat sink for design basis event mitigation; therefore, this system is safety-related.

The feedwater source for the AFW System for both normal conditions and design basis event mitigation is the Condensate Storage Tank. The Condensate Storage tanks are constructed of concrete with a stainless steel liner. The tank liner is evaluated in this section as a mechanical component. The concrete shell, roof, and base slab are evaluated in the Civil section Concrete Tank and Valve House Structures, Section 2.4.7. The Condensate Storage Tanks are fitted with a floating diaphragm to minimize oxygen absorption.

Scope Determination Summary

The Auxiliary Feedwater (AFW) System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(1) due to the requirements to remove heat from the Reactor Coolant System for design basis events, and to maintain containment integrity.

Certain nonsafety-related piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components, and is also included in the scope of license renewal based on the 10 CFR 54.4(a)(2) criterion.

Certain electrical components associated with this system are included on the EQ Master List. Portions of the system are evaluated in analyses for coping with fire events, and anticipated transient without scram events. The turbine-driven AFW pumps and related equipment are relied upon to provide makeup to the steam generators as part of the SBO coping analysis. Therefore, these components are included in the scope of license renewal based on the 10 CFR 54.4(a)(3) criterion.

The following 10 CFR 54.4 criteria are met by the Auxiliary Feedwater System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X	X	

VEGP UFSAR References

The Auxiliary Feedwater System is discussed in VEGP UFSAR Section 10.4.9, Auxiliary Feedwater System.

License Renewal Drawings

1X4LD161-1
1X4LD161-2
1X4LD161-3
1X4LD168-3

2X4LD161-1
2X4LD161-2
2X4LD161-3
2X4LD168-3

Components Subject to an AMR

Table 2.3.4.4 Auxiliary Feedwater System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Filter Housings	Pressure Boundary
3	Flow Orifice / Elements	Flow Restriction Pressure Boundary
4	Oil Coolers - TDAFWP Turbine (Channel Heads)	Pressure Boundary
5	Oil Coolers - TDAFWP Turbine (Shells)	Pressure Boundary
6	Oil Coolers - TDAFWP Turbine (Tubes)	Exchange Heat Pressure Boundary
7	Oil Coolers - TDAFWP Turbine (Tubesheets)	Pressure Boundary
8	Oil Reservoirs - TDAFWP Turbine Lube Oil	Pressure Boundary

Table 2.3.4.4, (Cont'd) Auxiliary Feedwater System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
9	Piping Components	Pressure Boundary
10	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary
11	Pump Casings - AFW Pumps	Pressure Boundary
12	Pump Casings - CST Vacuum Degasifier Pumps	Pressure Boundary
13	Pump Casings - TDAFWP Lube Oil Pumps	Pressure Boundary
14	Spargers - TDAFWP steam exhaust condensate	Flow distribution Pressure Boundary
15	Tank - CST Degasifier Tank	Pressure Boundary
16	Tank Diaphragms - CSTs	Physical Integrity
17	Tank Liners (& internals) - CST Liners	Pressure Boundary
18	Turbine Casings (AFW Pump Drive Turbine)	Pressure Boundary
19	Valve Bodies	Pressure Boundary

2.3.4.5 Auxiliary Steam System (1322)

System Description

The Auxiliary Steam System conveys auxiliary steam to the balance-of-plant systems during startup, shutdown, and normal operation. The supply of steam for this system is the Main Steam System. A cross-connect is provided so that a unit that is operating can supply steam to a unit that is shut down. When in operation, the Auxiliary Steam System performs the following functions:

- Heating of the condensate during preoperational cleanup of the Condensate and Feedwater System;
- Assisting in the attaining and holding of required vacuum in the main condensers;
- Sealing the glands of the main turbine and feedwater pump drive turbines prior to the availability of main steam;
- Preoperational testing of the auxiliary feedwater pump turbine and steam generator feedwater pump turbines;
- Heating the cleaning solutions used for preoperational cleaning of piping and equipment;
- Steam blanketing of moisture separator reheaters during plant shutdown;
- Assisting in deaeration of the main condensate during cold cleanup operations;
- As an alternative, preheating of main steam lines and main turbine shell following an extended main steam isolation and prior to entrance of steam from steam generators.

Scope Determination Summary

The Auxiliary Steam System is within the scope of license renewal based on the criteria of 10 CFR 54.4(a)(2) because certain piping in this system has the potential for spatial interaction with safety-related components, and/or is connected to (and provides support to) safety-related components.

The following 10 CFR 54.4 criteria are met by the Auxiliary Steam System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X					

VEGP UFSAR References

The Auxiliary Steam System is discussed in VEGP UFSAR Section 9.5.9, Auxiliary Steam System.

License Renewal Drawings

1X4LD161-3 2X4LD161-3

Components Subject to an AMR

Table 2.3.4.5 Auxiliary Steam System Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Closure Bolting	Pressure Boundary
2	Flow Orifice / Elements	Flow Restriction Pressure Boundary
3	Piping Components	Pressure Boundary
4	Steam / Fluid Trap Bodies	Pressure Boundary
5	Valve Bodies	Pressure Boundary

2.3.4.6 Electrohydraulic Control System (1615)

System Description

The steam turbine converts the thermal energy of the steam from the Main Steam System into mechanical energy used to drive the main generator and produce the plant electrical output. Integral to operation of the turbine is the Turbine Control System which includes the digital Electrohydraulic Control (EHC) System.

The Turbine Control System positions the steam valves controlling steam flow to the high pressure and low pressure turbines (i.e., high pressure control valves and stop valves, and low pressure intermediate stop valves and intercept valves). The EHC System operates to meet the fluid pressure demands for positioning of these steam valves. The Turbine Lube Oil System provides pressurized oil to the auto-stop oil header in addition to providing lubrication for the turbine. Loss of the auto-stop oil header pressure or the EHC fluid pressure to the actuators will close the steam valves (tripping the turbine).

The nonsafety-related components of the EHC System that are required to trip the turbine in response to an ATWS event are within the scope of license renewal in accordance with the regulated event scoping criteria of 10 CFR 54.4(a)(3). Those nonsafety-related components which trip the turbine in response to a turbine overspeed event are conservatively included in the scope of license renewal under 10 CFR 54.4(a)(2) of the Rule.

Scope Determination Summary

The EHC System is required to function for a turbine overspeed event and for ATWS, which meets 10 CFR 54.4(a)(2) and 10 CFR 54.4(a)(3) criteria.

The following 10 CFR 54.4 criteria are met by the Electrohydraulic Control System:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X				X	

VEGP UFSAR References

The turbine and turbine auxiliaries are discussed in VEGP UFSAR Sections 10.1, Summary Description, and VEGP UFSAR Section 10.2, Turbine-Generator. Turbine overspeed protection is discussed in VEGP UFSAR Section 10.2.2.3.1.5, Overspeed Protection. ATWS mitigation is discussed in VEGP UFSAR Section 7.7.1.11.

License Renewal Drawings

1X4LD194	2X4LD194

Components Subject to an AMR

There are no mechanical components of the Electrohydraulic Control System that are subject to an AMR. A review of the mechanical component functions during the screening process concludes that these system functions are accomplished by active components, and any failure of component pressure boundary would not prevent the performance of the system intended functions. This conclusion is consistent with the information presented in the NRC Standard Review Plan for license renewal, Table 2.1-5 for turbine controls that provide actuator and overspeed trip. The screening review concluded that the EHC System components do not perform any intended functions for license renewal; therefore, none of the EHC System components are subject to an aging management review.

2.4 SCOPING AND SCREENING RESULTS – STRUCTURAL SYSTEMS

The determination of structures within the scope of license renewal is made by identifying VEGP structures and determining which ones satisfy one or more criteria contained in 10 CFR 54.4. A description of this process is provided in Section 2.1, and the results of the structures scoping review are contained in Section 2.2.

The structures and structural components subject to AMR are identified in the following sections:

- Containment Structures Section 2.4.1
- Auxiliary, Control, Fuel Handling, and Equipment Buildings, Section 2.4.2
- Emergency Diesel Generator Structures, Section 2.4.3
- Turbine Building, Section 2.4.4
- Tunnels and Duct Banks, Section 2.4.5
- Nuclear Service Cooling Water (NSCW) Structures, Section 2.4.6
- Concrete Tank and Valve House Structures, Section 2.4.7
- Switchyard Structures, Section 2.4.8
- Fire Protection Structures, Section 2.4.9
- Radwaste Structures, Section 2.4.10
- Auxiliary Feedwater Pump House Structures, Section 2.4.11
- Component Supports and Bulk Commodities, Section 2.4.12

VEGP-unique structure identifying numbers are provided in parentheses beside the name of each structure (or group of structures).

2.4.1 CONTAINMENT STRUCTURES

The Containment Structures includes the following VEGP structures:

- Containment Buildings (2101)
- Containment Internal Structures (2148)

Structure Descriptions

Containment Building

The Containment Building is a Seismic Category 1 structure that completely encloses the reactor, the reactor coolant system, the steam generators, and portions of the auxiliary and engineered safety features systems. The Containment Building also houses components required for reactor refueling, which includes the polar crane, refueling cavity, and portions of the fuel handling system. The structure provides protection for these features from external events (e.g., tornado, flooding, etc.) and functions as a fission product barrier following an accident. The structure also provides biological shielding during normal operation and following a LOCA. The Plant Vent Stack is attached to the outside of the Containment Building and functions to provide an elevated release point.

The major elements of the Containment Building structure are the main structure and foundation, the steel containment liner, and the containment penetrations.

Containment Building Structure and Foundation - The containment structure consists of a prestressed reinforced concrete cylinder and hemispherical dome supported on a flat circular conventionally reinforced concrete basemat with a central cavity and instrumentation tunnel to house the reactor vessel. The prestressing of the containment is achieved by a two-way post-tensioning system consisting of circumferential hoop tendons and two groups of inverted U-shaped tendons. The U-shaped tendons are anchored at the ends under the bottom of the basemat. The hoop tendons are anchored at buttresses 240 degrees apart, bypassing the intermediate buttress. The buttresses are equally spaced at 120 degrees around the cylinder. The hoop tendons continue into the dome up to 45 degrees above the springline. A tendon access gallery is located beneath the perimeter of the base slab for the installation and inspection of the U-shaped tendons.

Steel Containment Liner - A welded steel liner is attached to the inside face of the containment structure concrete to serve as the leakage barrier. The floor liner plate is installed on top of the foundation slab and is then covered with concrete. At penetrations, the liner plate is thickened to reduce stress concentrations. The liner plate, including the thickened plate areas, is anchored to the concrete for stability.

Penetrations - In general, a containment penetration consists of a sleeve embedded in the concrete wall or floor and welded to the containment liner plate. Loads on the penetration are transferred to the containment structure. Containment penetrations include the equipment hatch and personnel access airlocks, the fuel transfer tube assembly, and the mechanical and electrical penetrations.

Equipment Hatch - An equipment hatch, equipped with an inside mounted steel hatch cover and a concrete external shield door, is provided to allow access into containment for large equipment. The external shield door acts as a biological and missile shield and is evaluated as a reactor building concrete element. The hatch cover is provided with concentric double-sealing gaskets, with provision for leak testing.

Personnel Access Locks (Airlocks) - Two airlocks penetrate the containment wall; a personnel access lock and a smaller personnel lock for emergency escape purposes. The access locks each consist of steel tubes passing through the containment wall and welded to the containment liner plate. Each access lock has a bulkhead with an airlock door at each end. The doors are interlocked to prevent simultaneous opening. Each door contains double gasketed seals.

Fuel Transfer Tube - One fuel transfer tube penetration per containment is provided for refueling. A one-piece inner pipe acts as the transfer tube. The tube is fitted with a double-gasketed blind flange at the containment refueling canal end and a gate valve at the fuel transfer canal end within the Fuel Handling Building. Three separate penetration sleeve assemblies, joined by four bellows assemblies, act as a transfer tube housing. The penetration sleeve assemblies permit the transfer tube to penetrate the refueling canal wall, the containment shell, and the exterior wall of the fuel handling building, while maintaining a pressure-retaining boundary at each wall. The transfer tube is supported by the two outboard bellows assemblies. The bellows assemblies allow thermal expansion of the transfer tube and housing and permit differential movement between buildings.

Mechanical Penetrations - The process piping portion of the mechanical containment penetration assemblies are not considered part of the containment structures, rather they are included in scope for License Renewal as part of the mechanical process systems scoping in Section 2.3. In the case of piping carrying hot fluid, the pipe is insulated and the flued head/penetration is designed to prevent excessive concrete temperatures. The pipe insulation is evaluated and included in scope for License Renewal under the mechanical systems scoping of thermal insulation in Section 2.3.3.31.

Electrical Penetrations - The VEGP electrical containment penetrations are Conax type penetrations. The electrical portion of these penetrations are not considered part of the containment structures, rather they are included in scope for License Renewal as part of the electrical and I&C systems scoping in Section 2.5.

Containment Internal Structures

The containment internal structures are comprised of concrete and steel components. The major concrete internal components include the reactor cavity and primary shield wall, secondary shield wall, refueling cavity (and transfer canal), and floor slabs. Portions of the concrete internal structures also act as ventilation “ducts” for in-scope containment ventilation systems. The major steel internal components are the refueling canal liner and steel framing (structural steel). Also included are miscellaneous structural items unique to the containment structures such as the emergency sump screens, the trisodium phosphate (TSP) baskets located on the containment base slab. Common structural commodities include supports for piping, cable trays, conduits, ventilation ducting, and other components, whip restraints, cable trays and conduits, platforms, grating, racks and frames, grating, etc.

Reactor Cavity and Primary Shield Walls - The reactor cavity is a heavily reinforced concrete structure that houses the reactor and provides the primary shielding barrier. The wall of the cavity structure provides missile protection for the containment structure and liner plate. The cavity wall provides biological shielding, supports the reactor, and transmits loads to the base slab.

Secondary Shield Walls - The secondary shield walls are thick reinforced concrete walls anchored into the base slab to ensure stability and prevent uplift. The compartment housing the pressurizer is an integral part of the secondary shield wall. The compartments housing the steam generators, reactor coolant pumps, and RCS loops are formed by the secondary shield walls on the exterior and the refueling canal walls on the interior. These compartments provide missile protection for the RCS components.

Refueling Cavity - The refueling cavity is a reinforced concrete structure extending above and to the side of the primary shield wall. The entire refueling canal is lined with stainless steel plate. The cavity is used during refueling to transfer fuel elements underwater between the reactor and the spent fuel pool. It is also a lay down area for the reactor vessel upper and lower internals.

Floor Slabs - The operating floor surrounds the refueling canal wall and the secondary shield walls. The operating floor is bounded by the containment wall. The operating floor slab is supported by the refueling canal walls and the secondary shield walls.

Steel Structures - The steel structures provides support for various safety-related and nonsafety-related systems and components, including piping, ducts, miscellaneous equipment, electrical cable trays and conduit, instruments and tubing, electrical and instrumentation enclosures and racks, steel beams and columns, stairways, ladders, and attachments to concrete walls and liners. The internal structures that support large components, such as the steam generators and reactor coolant pumps, are anchored to the base slab in order to transfer the loads. Structural and miscellaneous steel is installed in containment to facilitate access to the various elevations and areas for inspection and maintenance.

Emergency Sump Screens - The containment ECCS and CS sump recirculation line suction screens provide debris protection for the RHR/LHSI and containment spray pumps.

TSP Baskets - The trisodium phosphate (TSP) baskets located on the containment base slab. The TSP baskets contain soluble TSP that will dissolve into the containment sump fluid post-accident, to control pH of the water in the sump.

Cranes – The containment structures include cranes and lifting equipment such as the polar bridge crane, refueling machine, and jib cranes. Jib cranes are included in the structural steel component type and monorails are addressed separately as part of the bulk commodities review. The overhead heavy load handling cranes and the refueling load handling cranes and equipment are evaluated separately from the Containment Structures in Section 2.3.3, The Overhead Heavy and Refueling Load Handling System.

Scope Determination Summary

The Containment Structures perform functions that meet the license renewal scoping criteria of 10 CFR 54.4(a). The Containment Building functions as a fission product barrier to limit the release of radioactive fission products to the environment following an accident, and functions as a heat sink during the initial phase of a LOCA or MSLB (inside containment) event to limit the containment environmental conditions. The Containment Structures provide shelter and protection for safety-related and nonsafety-related SSCs for design basis events, including protection from internal and external missiles, and radiation shielding. The refueling cavity maintains borated water inventory during refueling operations to maintain adequate cooling of the fuel assembly. The Containment Structures also include SSCs such as the emergency sump screens and TSP baskets that are relied upon during a postulated accident.

The Containment Structures include supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the Containment Structures are relied upon for VEGP's compliance with the Commission's regulations on Station Blackout, Fire Protection, and ATWS.

The following 10 CFR 54.4 scoping criteria are met by the Containment Structures:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

VEGP UFSAR References

The Containment Structure, including the steel liner plate and prestressing system are discussed in VEGP UFSAR Section 3.8.1.

The equipment hatch, personnel lock assemblies, piping penetrations and electrical penetrations are discussed in VEGP UFSAR Section 3.8.2. The fuel transfer tube is discussed in Sections VEGP UFSAR Section 3.8.2.1.2 and Section 9.1.4.2.

Concrete and steel internal containment structures are discussed in VEGP UFSAR Section 3.8.3.

The ECCS and CS sump screens are discussed in VEGP UFSAR Section 6.2.2.2, Containment Spray System, and VEGP UFSAR Section 6.3, Emergency Core Cooling System.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements of the Containment Structure are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12, Component Supports and Bulk Commodities.

Table 2.4.1 lists the component types that require aging management review.

Table 3.5.2-1 provides the results of the aging management review.

Table 2.4.1 Containment Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Above Grade - Dome; wall; buttresses	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support
2	Concrete: Below Grade - wall; buttresses	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support
3	Concrete: Foundation; subfoundation	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support
4	Concrete: Internal Structures	Heat Sink Missile Barrier Shelter / Protection Structural Support
5	Concrete: Internal Structures – HVAC Duct	Flow Direction Structural Support
6	Penetration with Bellows - Fuel Transfer Tube Assemblies	Pressure Boundary Shelter / Protection Structural Support
7	Penetrations (Containment Boundary)	Pressure Boundary Structural Support
8	Personnel Airlocks and Equipment Hatches	Missile Barrier Radiation Shielding Pressure Boundary

Table 2.4.1 (Cont'd) Containment Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
9	Prestressing System: Tendons & Anchorage Components	Structural Support
10	Seals, Gaskets and Moisture Barriers	Radiation Shielding Pressure Boundary
11	Steel Components: All Structural Steel	Shelter / Protection Structural Support
12	Steel Components: Emergency Sump Screens (ECCS & Ctmt Spray)	Debris Protection Structural Support
13	Steel Components: Integrated Reactor Head Steel Assemblies	Missile Barrier Shelter / Protection Structural Support
14	Steel Components: Liner (Containment); liner anchors; integral attachments	Pressure Boundary Structural Support
15	Steel Components: Liners & Misc. Steel – Refueling Cavity & Transfer Canal	Pressure Boundary Shelter / Protection Structural Support Water Retention
16	Steel Components: Tri-Sodium Phosphate Baskets	Structural Support

2.4.2 AUXILIARY, CONTROL, FUEL HANDLING, AND EQUIPMENT BUILDINGS

The Auxiliary, Control, Fuel Handling, and Equipment Buildings includes the following VEGP structures:

- Auxiliary Building (2108)
- Control Building (2111)
- Fuel Handling Building (2109)
- Equipment Buildings (2102)

These structures are adjacent to each other and form a common complex that adjoins the Containment Buildings.

Auxiliary Building (2108)

Structure Description

The Auxiliary Building is a seven-story reinforced concrete Seismic Category 1 structure common to the two-unit plant. It is located south of the Fuel Handling Building and containment structures. Three stories are above grade; four are subterranean. There are two penetration areas, one on the south side of each containment. All Auxiliary Building columns, slabs, and structural walls are of reinforced concrete. The roof is a reinforced concrete slab with a minimum thickness of two feet. The Auxiliary Building structure is founded on a mat, continuous over the plan of the building. The Auxiliary Building houses major safety-related and nonsafety-related plant facilities such as Chemical and Volume Control System (CVCS), Emergency Core Cooling System (ECCS), Residual Heat Removal (RHR) System, HVAC facilities, and other associated equipment. Portions of the building that include the piping penetration areas for the Containment Buildings and radioactive systems are maintained under a slight negative pressure for radiological control.

Certain access openings are sealed with concrete block wall for radiation shielding and maintenance purposes. These are removable and short height. These concrete units are held captively in place by structural elements such as steel angle or steel beams. These concrete units are included in component type Masonry Walls: All, and steel elements are included in component type Structural Steel Components: All Structural Steel.

Scope Determination Summary

The Auxiliary Building is a Seismic Category 1 structure that provides shelter and protection for safety-related and nonsafety-related SSCs for design basis events. Redundant safety trains in the Auxiliary Building and other areas of the plant are separated and protected so that a loss of function of one train will not prevent the other train from performing its safety function. The Auxiliary Building include supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the Auxiliary Building are relied upon for VEGP's compliance with the Commission's regulations on Station Blackout, Fire Protection, and ATWS.

The following 10 CFR 54.4 scoping criteria are met by the Auxiliary Building:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

Control Building (2111)

Structure Description

The Control Building is a six-story, deeply embedded, reinforced concrete structure common to the two-unit plant. It is situated north of and adjacent to the fuel handling building and the two containment buildings. It is supported on a mat foundation 40 feet below grade. The boxlike center section has three upper levels extending to 60 feet above grade. A partial fourth level extends an additional 20 feet. Penetration areas east and west of the center section provide access to the two containment buildings. These are the primary areas for routing of electrical and control systems cable into the containment. Directly north of each containment building is an MSIV room which extends 40 feet above grade.

The floor at grade is principally occupied by the control room and technical support center. The floors immediately above and below grade house the cable spreading rooms. The lowest level houses switchgear and HVAC equipment. The third and fourth floors mainly contain HVAC equipment, while the fourth floor is primarily occupied by nonsafety-related components.

Scope Determination Summary

The Control Building is a Seismic Category 1 structure that provides shelter and protection for safety-related and nonsafety-related SSCs for design basis events. Redundant safety trains in the Control Building are separated and protected by the structural elements so that a loss of function of one train will not prevent the other train from performing its safety function. The Control Building includes supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the Control Building are relied upon for VEGP's compliance with the Commission's regulations on Station Blackout, Fire Protection, and ATWS.

The following 10 CFR 54.4 scoping criteria are met by the Control Building:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

Fuel Handling Building (2109)

Structure Description

The Fuel Handling Building is a five-story, boxlike, reinforced concrete structure common to the two-unit plant. It is completely surrounded by other Category I buildings and is located between the two containment structures. The fuel storage facility is an integral part of the Fuel Handling Building and consists of the new fuel storage area, spent fuel pool (including the structure, liner, and fuel storage racks), fuel transfer canal, cask storage area, cask washdown area, and rooms containing supporting equipment.

Each nuclear unit has a separate but interconnected spent fuel pool. The pool is approximately 41 feet deep, constructed of reinforced concrete, and lined with stainless steel plate. The spent fuel pool is designed for underwater storage of spent fuel assemblies after their removal from the reactor. New fuel may be moved from the new fuel racks to the spent fuel racks in preparation for a refueling outage.

The fuel transfer canal is an intermediate handling area. The fuel transfer canal is connected to the refueling canal inside containment by the fuel transfer tube which is evaluated as part of the Containment Structures in Section 2.4.1. The fuel transfer canal may be drained to service the fuel handling equipment or flooded for fuel handling. The cask storage area provides a location to place a shipping cask for loading. The cask wash area provides an isolated area for cleaning and decontamination of shipping casks. Adjacent rooms contain Spent Fuel Cooling and Cleanup System equipment that cools and purifies the SFP water.

The Fuel Handling Building's overhead and refueling load handling cranes are evaluated separately in Section 2.3.3.3, Overhead Heavy and Refueling Load Handling System.

Scope Determination Summary

The Fuel Handling Building is a Seismic Category 1 structure that provides shelter and protection for safety-related and nonsafety-related SSCs for design basis events. The spent fuel pool (and fuel transfer canal when in use) maintain borated water inventory to maintain adequate cooling of the spent fuel assemblies as well radiological shielding. The Fuel Handling Building include supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the Fuel Handling Building are relied upon for VEGP's compliance with the Commission's regulations on Fire Protection.

The following 10 CFR 54.4 scoping criteria are met by the Fuel Handling Building:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

<u>Equipment Building (2102)</u>

Structure Description

The Equipment Building is not a distinct structure, but is composed of portions of the Control Building and Fuel Handling Building. The Equipment Building partially surrounds the Containment Building (approximately three quadrants). The Equipment Building is a Seismic Category 2 structure; however, it is designed to Seismic Category 1 requirements to preclude any safety impact on the safety-related equipment located in the Control Building and Fuel Handling Building. The primary function of the Equipment Building is to support nonsafety-related heating, cooling, and air-conditioning (HVAC) equipment. The boundary of the Equipment Building included in the evaluation is the entire structure, including the concrete and steel supported floors, ceilings, walls, and columns in parts of the Control Building and the Fuel Handling Building that comprise the Equipment Building.

Scope Determination Summary

The Equipment Building is a Seismic Category 2 structure that is designed to Seismic Category 1 requirements to preclude any safety impact on the safety-related equipment and therefore meets the scoping criteria for 10 CFR 54.4(a)(2). The structure is evaluated for tornado loadings and to ensure adequate protection for the safety-related items located in the Control Building, Fuel Handling Building, and Auxiliary Building from tornado-generated missiles. The Equipment Building includes structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the Equipment Building are relied upon for VEGP's compliance with the Commission's regulations on Fire Protection.

The following 10 CFR 54.4 scoping criteria are met by the Equipment Building:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X			X		

VEGP UFSAR References

The Auxiliary, Fuel Handling, Control, and Equipment Buildings are discussed in VEGP UFSAR Section 3.8.4.1, Description of the Structures, and Section 3.8.5.1, Description of the Foundations.

The Fuel Storage Facility is discussed in VEGP UFSAR Section 9.1, Fuel Storage and Handling.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements of the Auxiliary, Control, Fuel Handling, and Equipment Buildings are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.2 lists the component types that require aging management review.

Table 3.5.2-2 provides the results of the aging management review.

Table 2.4.2 Auxiliary, Control, Fuel Handling, and Equipment Buildings Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Missile Barrier Shelter / Protection Structural Support
2	Concrete: Exterior below grade	Shelter / Protection Structural Support
3	Concrete: Foundation	Shelter / Protection Structural Support
4	Concrete: Interior	Flood Barrier Shelter / Protection Structural Support
5	Concrete: Roof slab	Missile Barrier Shelter / Protection Structural Support
6	Masonry Walls: All	Radiation shielding
7	Steel Components: All structural steel	Shelter / Protection Structural Support
8	Steel Components: Fuel Pool Gate	Shelter / Protection Structural Support Water Retention
9	Steel Components: Spent Fuel Pool Liners	Shelter / Protection Structural Support Water Retention
10	Sump Liner Plate	Shelter / Protection

2.4.3 EMERGENCY DIESEL GENERATOR STRUCTURES

The Emergency Diesel Generator Structures includes the following VEGP structures:

- Diesel Generator Buildings (2107)
- Diesel Fuel Storage Tank Pump Houses (2131)

Each Diesel Generator Building and associated Diesel Fuel Storage Tank Pump Houses are in proximity to each other and support operation of the emergency diesel generators.

Structure Descriptions

Diesel Generator Buildings (2107)

The Diesel Generator Buildings (one for each unit) are rectangular, reinforced concrete Seismic Category I structures, designed to withstand the various combination of loads as defined in the VEGP UFSAR. Each bay houses a diesel generator, air handling, exhaust, and silencing equipment. The primary function of the Diesel Generator Building is to house the diesel generators that are needed to supply emergency onsite power in the event that offsite power is lost.

Diesel Fuel Storage Tank Pump House (2131)

The Diesel Fuel Storage Tank Pump Houses (two for each unit) are Seismic Category I structures that shelter the pumps and valves for the buried diesel fuel oil storage tanks supplying the emergency diesel generators. The Diesel Fuel Storage Tank Pump Houses house the nozzles, gages, drains, and pump mount systems. The reinforced concrete pump houses straddle the tanks and extend 3 feet above grade except for a common entry between each pair of pump houses, which extends 14 feet above grade. Each pump house foundation consists of wall strip footings. The pump houses are boxlike with work space levels above the top of the tanks.

The buried diesel fuel oil storage tanks for the emergency diesel generators are not included as part of the structure; these tanks are addressed in the mechanical scoping for the auxiliary systems in Section 2.3.3.20, Emergency Diesel Generator System.

Scope Determination Summary

The Emergency Diesel Generator Structures are Seismic Category I safety-related structures that function to provide shelter and protection for the diesel generators that are relied upon to supply emergency onsite power in the event that offsite power is lost. The structures provide shelter and protection for safety-related and nonsafety-related SSCs. Redundant safety trains are separated and protected by the structural elements so that a loss of function of one train will not prevent the other train from performing its safety function. The Emergency Diesel Generator Structures include supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected.

The emergency diesel generators provide emergency power if needed for performing safe shutdown in the event of a fire. For SBO, startup of the emergency diesel generators to recover from an SBO event using onsite power is relied upon to terminate the event. Also, the emergency diesel generator reliability is an input in determining the VEGP SBO coping duration. Consequently, some of the structural commodities and supports for SSCs in the Emergency Diesel Generator Structures, are relied upon for VEGP's compliance with the Commission's regulations for Station Blackout and Fire Protection.

The following 10 CFR 54.4 criteria are met by the Emergency Diesel Generator Structures:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X		

VEGP UFSAR References

The Diesel Generator Buildings and Diesel Fuel Storage Tank Pump Houses are discussed in VEGP UFSAR Section 3.8.4.1, Description of the Structures, and UFSAR Section 3.8.5.1, Description of the Foundations.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements of the Emergency Diesel Generator Structures are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12, Component Supports and Bulk Commodities.

Table 2.4.3 lists the component types that require aging management review.

Table 3.5.2-3 provides the results of the aging management review.

Table 2.4.3 Emergency Diesel Generator Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Missile Barrier Shelter/Protection Structural Support
2	Concrete: Foundation	Shelter/Protection Structural Support
3	Concrete: Interior	Shelter/Protection Structural Support
4	Concrete: Roof slab	Missile Barrier Shelter/Protection Structural Support
5	Steel Components: All structural steel	Shelter/Protection Structural Support

2.4.4 TURBINE BUILDING (2110)

Structure Description

The Turbine Building is a nonsafety-related, Seismic Category II structure. The Turbine Building houses all equipment associated with the main turbine-generator including the main condenser, and also houses other power generation and auxiliary equipment.

The Turbine Building is a steel-framed structure enclosed with reinforced concrete roof and metal siding. It is a trussed rigid-frame structure above the turbine deck level; the frames are braced below the turbine deck level to reduce side sway. The building has three floors and a basement. The floors are reinforced concrete or steel grating. The building foundation system consists of a mat foundation which also supports the turbine pedestal.

The turbine-generator pedestal supports the turbine-generator unit. The pedestal is of massive reinforced concrete, designed to withstand operating and emergency loading forces including seismic disturbances and machine unbalance. The turbine-generator pedestal consists of a reinforced concrete deck on columns attached to a basemat.

Also included as part of the Turbine Building structure is the elevated electrical bridge structure between the main structure and the Control Building.

Scope Determination Summary

The Turbine Building does not contain any essential safety-related equipment, however it is connected to other safety-related structures by piping and electrical tunnels and is also in close proximity to the Auxiliary/Control/Fuel Handling/Equipment Buildings complex. Consequently, the main structure and the electrical bridge structure are within the scope of license renewal due to 10 CFR 54.4(a)(2) requirements because of the close proximity to Seismic Category I structures. The turbine-generator pedestal is isolated from the Turbine Building structure and is not within the scope of license renewal. The Turbine Building also includes structural components and supports that must be maintained such that safety-related equipment is not affected.

Although not defined as essential, the Turbine Building includes components classified as safety-related that are used as sensors for providing input signals to, and as actuation devices for, the reactor trip and engineered safety features actuation systems (e.g., anticipatory reactor trip function on a turbine trip, turbine impulse pressure signal, steam dump solenoids, and turbine trip actuation on a reactor trip). The associated supports and raceways are classified in the CLB consistent with the components and are in the scope of license renewal under the 10 CFR 54.4(a)(1) criterion and scoped and evaluated under Section 2.4.12**,** Component Supports and Bulk Commodities. The Turbine Building structure is classified as a nonsafety-related structure under the current licensing basis, therefore the associated structural features

Turbine Building structure remains classified as a nonsafety-related structure for license renewal consistent with the current licensing basis.

Additionally, some of the structural commodities and supports for SSCs in the Equipment Building are relied upon for VEGP's compliance with the Commission's regulations on ATWS and SBO. For ATWS, structural SSCs supporting the turbine impulse input signal to the AMSAC system and the output signal to the turbine trip solenoids are in the scope of license renewal. For SBO, the structural SSCs that support the power feeds from the low voltage switchyard to the Class 1E switchgear that are relied upon for restoration of offsite power are in the scope of license renewal.

The following 10 CFR 54.4 criteria are met by the Turbine Building						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X		X		X	

VEGP UFSAR References

The Turbine Building is discussed in VEGP UFSAR Section 1.2.2, Facility Description, and VEGP UFSAR Section 3.7.B.2.4.1, Deeply Embedded Structures.

The reactor trip system instrumentation in the Turbine Building is described in VEGP UFSAR Section 7.2.1.1.2.F, Reactor Trip System Description - Reactor Trip on a Turbine Trip (Anticipatory).

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

Structural elements located in the Turbine Building and in the scope of license renewal have been evaluated. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.4 lists the component types that require aging management review.

Table 3.5.2-4 provides the results of the aging management review.

Table 2.4.4 Turbine Building Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Shelter/Protection Structural Support
2	Concrete: Exterior below grade	Shelter/Protection Structural Support
3	Concrete: Foundation	Shelter/Protection Structural Support
4	Concrete: Interior	Shelter/Protection Structural Support
5	Concrete: Roof Slab	Shelter/Protection Structural Support
6	Masonry Walls	Structural Support
7	Steel Components: All Structural Steel	Shelter/Protection Structural Support

2.4.5 TUNNELS AND DUCT BANKS (2144-A)

Structure Description

Tunnels and Duct Banks include mechanical piping tunnels, electrical cable tunnels, duct banks, and valve and pull boxes. The Radwaste Transfer Tunnel is not included in this structures grouping; rather, it is evaluated as part of the Radwaste Structures in Section 2.4.10.

The Category 1 tunnels in the scope of license renewal consist of main steam, nuclear service cooling water (NSCW), diesel generator piping, diesel generator electric, auxiliary feedwater, turbine electric and electric steam boiler tunnels. The main steam and electric steam boiler tunnels are designed for Seismic Category 1 criteria and for pipe break loads due to their proximity to and interface requirements with other Seismic Category 1 structures; however, the effects of tornado missiles do not have to be considered.

The Category 1 tunnels are box-like, reinforced concrete structures, either completely buried or with their roofs exposed, at or near grade level. The tunnels house piping and electrical trays. The main steam tunnel roof is mainly provided with grating instead of concrete to allow for venting in the event of postulated pipe breaks. The auxiliary feedwater tunnels are covered with removable concrete slabs, which are bolted down to prevent them from becoming missiles in the event of a postulated auxiliary feedwater line break.

The underground electrical duct banks, for safety-related (SR) electrical cables routed to and from SR buildings and equipment, are rectangular reinforced concrete structures poured in-place around PVC conduit. Also included are nonsafety-related duct runs related to SBO [e.g., duct runs for high voltage switchyard].

Valve boxes and pull boxes are rectangular reinforced concrete pull boxes with steel or aluminum covers for safety-related and aluminum covers for nonsafety-related boxes. These boxes are strategically located to provide above ground access to isolation valves and to cables in buried piping and cable runs routed through the pull boxes to appropriate duct banks.

Scope Determination Summary

The in-scope Tunnel and Duct Bank structures include Seismic Category 1 structures and nonsafety-related structures. These structures provide shelter and protection for safety-related and nonsafety-related SSCs.

The Tunnels and Duct Banks include structures and supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some structural commodities and supports for SSCs in the Tunnels and Duct Banks are relied upon for VEGP's compliance with the Commission's regulations on Station Blackout, Fire Protection, and ATWS.

The following 10 CFR 54.4 criteria are met by the Tunnels and Duct Banks						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

VEGP UFSAR References

The Category 1 Tunnels are discussed in VEGP UFSAR Section 3.8.4.1, Description of the Structures, and VEGP UFSAR Section 3.8.5, Description of the Foundations.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements of the in-scope Tunnel and Duct Bank structures are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.5 lists the component types that require aging management review.

Table 3.5.2-5 provides the results of the aging management review.

Table 2.4.5 Tunnels and Duct Banks Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Shelter/Protection Structural Support
2	Concrete: Exterior below grade	Shelter / Protection Structural Support
3	Concrete: Foundations	Shelter / Protection Structural Support
4	Concrete: Interior	Shelter / Protection Structural Support
5	Steel Components: All Structural Steel	Shelter / Protection Structural Support

2.4.6 NUCLEAR SERVICE COOLING WATER (NSCW) STRUCTURES (2105)

Structure Description

The Nuclear Service Cooling Water (NSCW) Structures include the following VEGP structures:

- NSCW Cooling Towers
- NSCW Valve Houses

The NSCW structures consist of four NSCW cooling towers (2 per reactor unit) and their associated valve houses. The NSCW structures are Seismic Category I safety-related structures, designed to withstand the various load combinations defined in the VEGP UFSAR.

The NSCW towers and valve houses function to support and protect the appropriate NSCW system components during normal plant operation and shutdown conditions, as well as during severe environmental conditions of earthquakes, extreme wind, tornadoes, and other abnormal conditions associated with postulated accidents. The NSCW towers are relied upon to function as the ultimate heat sink to support normal operation, safe shutdown and post-accident heat loads.

Each NSCW cooling tower is comprised of a cooling tower superstructure and a below-grade storage basin. Each cooling tower and storage basin structure is a reinforced concrete cylindrical shell with a concrete basemat and flat roof deck. The foundation for the nuclear service cooling water (NSCW) tower consists of a 9-foot-thick circular mat, 100 feet in diameter.

The NSCW valve house next to each NSCW tower is a transition structure which protects the piping, valves, and electrical supply running from the NSCW tunnels into the tower. The valve houses are irregular shaped reinforced concrete structures with roofs approximately 14 feet above grade and basemat tops approximately 14 feet below grade to match the NSCW tunnels. The NSCW valve house is supported on a 6-foot-thick mat foundation.

The mechanical equipment associated with the NSCW Structures is addressed under the evaluation of Auxiliary Systems in Section 2.3.3.4, Nuclear Service Cooling Water System.

Scope Determination Summary

The NSCW Structures are relied upon to accomplish safety-related heat removal requirements for normal operation, safe shutdown, and post-accident response. The structures provide shelter and protection for safety-related and nonsafety-related SSCs. Redundant safety trains are separated and protected by the structures so that a loss of function of one train will not prevent the other train from performing its safety function. The NSCW Structures include supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some of the structural commodities and supports for SSCs in the NSCW Structures are relied upon for VEGP's compliance with the Commission's regulations for Fire Protection.

The following 10 CFR 54.4 criteria are met by the NSCW Structures						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

VEGP UFSAR References

The Nuclear Service Cooling Water (NSCW) Structure is discussed in VEGP UFSAR Section 3.8.4.1.7, Description of the Structures – NSCW Towers and Valve Houses, and Section 3.8.5.1, Description of the Foundations – NSCW Tower and Valve House, and VEGP UFSAR Section 9.2.5, Ultimate Heat Sink.

The NSCW System is discussed in VEGP UFSAR Section 9.2.1, Nuclear Service Cooling Water System.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements located in the NSCW Structures are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.6 lists the component types that require aging management review.

Table 3.5.2-6 provides the results of the aging management review.

Table 2.4.6 Nuclear Service Cooling Water (NSCW) Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Missile Barrier Shelter/Protection Structural Support
2	Concrete: Exterior below grade	Shelter/Protection Structural Support
3	Concrete: Foundation	Shelter/Protection Structural Support
4	Concrete: Interior	Flood Barrier Shelter/Protection Structural Support
5	Concrete: Roof slab	Missile Barrier Shelter/Protection Structural Support
6	NSCW Cooling Tower Basin	Structural Support Water Retention
7	NSCW Cooling Tower Drift Eliminator	Moisture Elimination
8	NSCW Cooling Tower Fill Material	Flow Direction Heat Sink
9	NSCW Cooling Tower Stack	Flow Distribution Shelter/Protection
10	NSCW Cooling Tower Steel Structures	Structural Support
11	NSCW Cooling Tower Structures Above Grade	Structural Support Water Retention
12	Steel Components: All structural steel	Shelter/Protection Structural Support

2.4.7 CONCRETE TANK AND VALVE HOUSE STRUCTURES

The Concrete Tank and Valve House Structures include the following VEGP structures:

- Condensate Storage Tanks and Valve Houses (2130)
- Reactor Makeup Water Storage Tanks (2128)
- Refueling Water Storage Tanks (2129)

The tanks evaluated include the Condensate Storage Tank (CST), Reactor Make-up Water Storage Tank (RMWST), and Refueling Water Storage Tank (RWST). Each unit has two dedicated CSTs, one RMWST, and one RWST.

This structures evaluation only applies to the concrete tanks, tank foundations, retaining walls, and other structural support components associated with system components in the tank area.

The mechanical system functions are discussed separate under the associated mechanical system description. The stainless steel tank liners, provided on the water side of the wall and floor of each of the tanks, and the tank diaphragms provided in the CSTs and RMWSTs, are evaluated under the mechanical scope of review as part of the associated mechanical system in Section 2.3.

<u>Condensate Storage Tanks and Valve Houses (2130)</u>

Structure Description

The Condensate Storage Tank is a Seismic Category I, safety-related, 480,000 gallon capacity cylindrical reinforced concrete shell. Each pair of condensate water storage tanks has a common reinforced concrete valve house which provides missile protection for piping and equipment. Each pair of condensate water storage tanks is supported by a combined foundation mat. The perimeter dikes for tanks are provided for retention of spilled water, constructed of reinforced concrete integral to the basemats. The CST provides a source of condensate water for the Auxiliary Feedwater System and for normal make-up and supply to the condenser hot well.

Scope Determination Summary

The CST is relied upon as the safety-related source of condensate for Auxiliary Feedwater System operation to maintain SG water level to support decay heat removal and plant cooldown. The concrete tank structure provides shelter and protection of the required water volume and is classified as safety-related. The CST valve houses also provide shelter and protection. The CST complex includes structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. The CST is also relied upon for VEGP's compliance with the Commission's regulations for SBO, Fire

Protection, and ATWS. The CST provides the water supply for the AFW System for these regulated events.

The following 10 CFR 54.4 criteria are met by the Condensate Storage Tanks						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

Reactor Make-up Water Storage Tanks (2128)

Structure Description

The Reactor Make-up Water Storage Tank (RMWST) is a Seismic Category I, safety-related 165,000 gallon capacity cylindrical reinforced concrete shell. Each RMWST is supported by a basemat foundation at grade. The perimeter dikes for tanks are provided for retention of spilled water and constructed of reinforced concrete integral to the basemats. The RMWST provides makeup water for the Reactor Coolant System. The tanks are fitted with floating diaphragms which minimize oxygen absorption.

Scope Determination Summary

The RMWST is relied upon as a Seismic Category I assured makeup source for the fuel handling building sumps, and as a backup Seismic Category 1 makeup water supply to the spent fuel pool, component and auxiliary component cooling water surge tanks, and ESF chiller expansion tanks. The concrete tank structure provides shelter and protection of the required water volume and is classified as safety-related. The RMWST complex includes structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, the RMWST complex includes structures and supports for fire protection features relied upon for VEGP's compliance with the Commission's regulations for Fire Protection.

The following 10 CFR 54.4 criteria are met by the Reactor Makeup Water Storage Tanks						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

Refueling Water Storage Tanks (2129)

Structure Description

The Refueling Water Storage Tank (RWST) is a Seismic Category I, safety-related, 715,500 gallon capacity cylindrical reinforced concrete shell. Each RWST is supported by a basemat foundation at grade. The perimeter dikes for tanks are provided for retention of spilled water and constructed of reinforced concrete and are integral portions of the basemats. The RWST is designed to hold enough dilute boric acid solution to fill the refueling canal prior to refueling operations, and to provide injection water to support emergency core cooling and containment spray functions.

Scope Determination Summary

The RWST is relied upon as an emergency borated water source for the ECCS and containment spray system. The concrete tank structure provides shelter and protection of the required water volume. The RWST complex includes structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, the RWST is relied upon for achieving and maintaining safe shutdown in the event of a fire, and the RWST complex includes structures and supports for fire protection features relied upon for VEGP's compliance with the Commission's regulations for Fire Protection.

The following 10 CFR 54.4 criteria are met by the Refueling Water Storage Tanks						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X			X		

VEGP UFSAR References

The Category I Water Storage Tanks are discussed in VEGP UFSAR Section 3.8.4.1.8, Description of the Structures – Category I Water Storage Tanks, and VEGP UFSAR Section 3.8.5.1.8, Description of the Foundations – Category I Water Storage Tanks.

The CST is also discussed in VEGP UFSAR Section 9.2.6, Condensate Storage Facility, and the RMWST in VEGP UFSAR Section 9.2.7, Reactor Makeup Facility. RWST operation as part of the ECCS is described in VEGP UFSAR Section 6.3, Emergency Core Cooling System.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements located in the Concrete Tank and Valve House Structures are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.7 lists the component types that require aging management review.

Table 3.5.2-7 provides the results of the aging management review.

Components Subject to an AMR

Table 2.4.7 Concrete Tank and Valve House Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior above grade	Flood Barrier Missile Barrier Shelter/Protection Structural Support
2	Concrete: Foundation	Shelter/Protection Structural Support
3	Concrete: Roof Slab (Tank Top)	Shelter/Protection Structural Support
4	Steel Components: All structural steel	Shelter/Protection Structural Support
5	Tank Manways	Shelter/Protection Debris Protection

2.4.8 SWITCHYARD STRUCTURES

The Switchyard Structures include the following VEGP structures:

- High Voltage Switchyard (2523)
- Low Voltage Switchyard (2523-L)

Portions of the low voltage and high voltage switchyards are included in the scope of license renewal. Specifically, the plant system portions of the Switchyard Structures that support restoration of offsite power during recovery from a SBO event are in the scope of license renewal.

The duct banks that connect the high and low voltage switchyards are not evaluated as part of the Switchyard Structures, rather they are evaluated as part of "Tunnels and Duct Banks" in Section 2.4.5.

Structure Descriptions

High Voltage Switchyard (2523)

The High Voltage Switchyard is the interconnection point for the off-site transmission lines and generator output lines, as well as the feeds to the unit startup transformers. The High Voltage Switchyard electrical installation provides the facilities for interconnecting the two preferred power sources from the offsite transmission lines to the transformer yards at Plant Vogtle as required per NRC General Design Criterion 17. The High Voltage Switchyard structures includes a switch house whose primary function is to relieve space congestion in the main control room and to locate the switchyard relay panels closer to their associated equipment. The switch house also provides space for other switchyard equipment.

Low Voltage Switchyard (2523-L)

The Low Voltage Switchyard is adjacent to the Turbine Building. The main power, unit startup, and unit auxiliary transformers are located in the Low Voltage Switchyard. The Low Voltage Switchyard electrical installation provides the facilities for interconnecting the high-voltage switchyard to the plant. The high and low voltage switchyards are connected by both overhead and underground cables.

Scope Determination Summary

The switchyard structures are included within the scope of License Renewal for compliance with the Commission's regulations on station blackout (SBO). Specifically, the plant portion of the High and Low Voltage Switchyards that are relied upon for restoration of offsite power following a SBO event are included in scope consistent with previous NRC staff guidance. The scoping for SBO is described in Section 2.1.2.3.5.

The following 10 CFR 54.4 criteria are met by the Switchyard Structures						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
			X			

VEGP UFSAR References

The Switchyard is discussed in VEGP UFSAR Section 8.2.1, Offsite Power System - System Description.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

The structural elements of the switchyards within the scope of license renewal are steel structures (not including transmission towers), concrete foundations, bolting, embedded plates and inserts that support the plant system portion of the offsite power system used to connect the safety-related buses to offsite power and recover from an SBO event. In the high voltage switchyard (500kV portion), this includes the switch house and its foundation. In the low voltage switchyard, this includes the startup transformer foundation, steel frames, and support towers. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.8 lists the component types that require aging management review.

Table 3.5.2-8 provides the results of the aging management review.

Table 2.4.8 Switchyard Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior Above Grade	Shelter/Protection Structural Support
2	Concrete: Foundation	Shelter/Protection Structural Support
3	Concrete: Roof Slab	Shelter/Protection Structural Support
4	Masonry Walls	Shelter/Protection
5	Steel Components: All Structural Steel	Shelter/Protection Structural Support

2.4.9 FIRE PROTECTION STRUCTURES (2506)

Structure Description

The Fire Protection Structures include the Fire Water Pumphouses and the structural support features of the, Fire Water Storage Tanks. These structures are within the scope of license renewal for fire protection. The Fire Water Storage Tanks are evaluated as part of the mechanical systems evaluation of the Fire Protection Systems in Section 2.3.3.19.

Fire Water Pumphouses

The primary function of the fire pumphouses is to house conventional fire protection water pumps which supply water for extinguishing fires. The Fire Water Pumphouses provide structural support, fire barrier separation, and environmental protection for the fire pumps and their auxiliary components. Only the fire protection features including fire rated block walls, equipment pedestals and the concrete foundation of the building are within the scope of license renewal.

There are two Fire Water Pumphouses at VEGP. Fire pumphouse No. 1 contains one electric motor-driven fire pump and one electric motor-driven jockey pump. Fire pumphouse No. 2 contains two diesel-driven fire pumps and one electric motor-driven jockey pump. The floor slab, perimeter footing, and equipment block pads consist of a reinforced concrete mat slab. The buildings are one-story concrete masonry structures with steel-framed roofs which support the concrete roof fill via steel decking.

Fire Water Storage Tank Foundations

The Fire Water Storage Tank (FWST) foundations support two separate fire water storage tanks. The boundary includes a reinforced concrete ring beam and a mat of oiled sand inside the ring beam and underneath the bottom of the tanks. Two 300,000 gallon Fire Water Storage Tanks are located adjacent to the Fire Water Pumphouse. The fire protection tanks are vertical cylindrical, flat bottom tanks made of steel plate.

Scope Determination Summary

The Fire Protection Structures are included within the scope of License Renewal for compliance with the Commission’s regulations on Fire Protection (10 CFR 50.48). Specifically, the Fire Water Pumphouses and the Fire Water Storage Tanks foundations.

The following 10 CFR 54.4 criteria are met by the Fire Protection Structures						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
	X			X		

VEGP UFSAR References

The Fire Protection Structures are discussed in VEGP UFSAR Section 9.5.1.2.2.4, System Description.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope Fire Protection Structures. Structural elements are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.9 lists the component types that require aging management review.

Table 3.5.2-9 provides the results of the aging management review.

Table 2.4.9 Fire Protection Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior Above Grade	Shelter Protection Structural Support
2	Concrete: Exterior Below Grade	Shelter Protection Structural Support
3	Concrete: Foundation	Shelter Protection Structural Support
4	Concrete: Interior	Shelter Protection Structural Support
5	Concrete: Roof Slab	Shelter Protection Structural Support
6	FWST – Concrete: Foundation Beam	Structural Support
7	FWST – Hold Down Bolts	Structural Support
8	Masonry Walls	Shelter Protection Structural Support
9	Steel Components: All Structural Steel	Shelter Protection Structural Support

2.4.10 RADWASTE STRUCTURES

The radwaste structures house equipment and provide space for processing, packaging, and storage of radioactive wastes generated in the course of normal plant operation. The Radwaste Structures in the scope of license renewal include the following VEGP structures:

- Radwaste Transfer Tunnel (2165)
- Radwaste Transfer Building (2165)
- Dry Active Waste Warehouse (2165)
- Dry Active Waste Processing Facility (2165)
- Radwaste Processing Facility (1901-B)
- Alternate Radwaste Building (1901-A)

These structures contain fire detection and suppression systems that minimize radioactive releases to the environment in the event of a fire and therefore conservatively support VEGP's compliance with the Commission's regulations on Fire Protection (10 CFR 50.48).

The Radwaste Solidification Building (RSB) is not included as part of the Radwaste Structures since it has been abandoned in place and does not include any in-scope features.

Structure Description

<u>Dry Active Waste (DAW) Warehouse and DAW Processing Facility</u>

The Dry Active Waste (DAW) buildings consist of processing and storage buildings. These buildings are located in the southwest portion of the owner-controlled area. They are metal siding buildings, supported on base slabs, with precast concrete panels and concrete masonry walls for shielding. The roofs are metal panels supported by steel beams. The processing building contains equipment for processing dry waste in preparation for offsite shipment, and the storage building is used to store DAW prior to offsite shipment. The grade elevation is above that required for natural flood protection. Curbs and ramps are provided, in radioactive areas, to contain water from fire sprinkler actuation.

<u>Radwaste Processing Facility</u>

The Radwaste Processing Facility, located between the Solidification Building and the Field Support Building, is a concrete building supported on a slab to house process equipment for handling radioactive liquids, resins, and filters. The Radwaste Processing Facility contains a subterranean demineralizer vault, subterranean HIC storage vaults, a rollup door for a truck bay, and a 40-ton bridge crane to service equipment. The slab and shield walls inside the building are designed for retaining radioactive liquids.

Alternate Radwaste Building (ARB)

The Alternate Radwaste Building (ARB) and its associated systems and equipment were designed to provide the capability of processing liquid and solid waste without utilizing the solidification systems and evaporators of the original plant design. The Alternate Radwaste Building which formerly housed the liquid radwaste systems, is a metal siding building supported on a base slab with a "lean-to" structure on the north side for storage. The building basemat is designed with curbing to retain radioactive liquid. It contains a demineralizer vault, high integrity container (HIC) system storage vault, laydown area, and a truck-trailer loading bay. Areas have been allotted to stage process shields and process skids.

Radwaste Transfer Building

The Radwaste Transfer Building is a two-story structure with the basemat located at grade. The Radwaste Transfer Building and Radwaste Transfer Tunnel are no longer in service and have been abandoned in place. However, the Radwaste Transfer Building has a fire damper on the fire rated west wall credited with preventing smoke and fire from entering the Auxiliary Building through the Radwaste Transfer Tunnel, and other fire protection equipment is also located in this building, with the associated supports.

Radwaste Transfer Tunnel

The Radwaste Transfer Tunnel is a buried reinforced concrete structure. This tunnel connects the Auxiliary Building, Radwaste Transfer Building, and Radwaste Solidification Building. The tunnel houses pipes for transferring liquid and slurry wastes to the Radwaste Solidification Building (which has been abandoned in place), pipes for related services, and a walkway for access. Though the Radwaste Transfer Tunnel has been abandoned in place, a portion of it is in scope because of the fire protection and electrical components related to fire protection that pass through portions of it. Conservatively, the tunnel from Auxiliary Building to the entrance of the Radwaste Transfer Building (concrete structure and fire protection supports) and south end of the tunnel (support for in-scope electrical commodities only) are considered in scope for LR.

Scope Determination Summary

The Radwaste Structures, while not safety-related, contain fire detection and suppression systems that minimize radioactive releases to the environment in the event of a fire and therefore conservatively support VEGP’s 10 CFR 50.48 compliance. Therefore, the fire protection features in the Dry Active Waste (DAW) Warehouse, DAW Processing Facility, Radwaste Process Facility, Alternate Radwaste Building, Radwaste Transfer Building, and the Radwaste Transfer Tunnel are in the scope of license renewal.

The following 10 CFR 54.4 criteria are met by the Radwaste Structures						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
				X		

VEGP UFSAR References

The Radwaste Structures are discussed in VEGP UFSAR Section 1.2.2. The Radwaste Systems are discussed in VEGP UFSAR Section 11, Radioactive Waste Management.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

Structural elements of the Radwaste Structures related to fire protection features, are included in scope and evaluated for license renewal. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.10 lists the component types that require aging management review.

Table 3.5.2-10 provides the results of the aging management review.

Table 2.4.10 Radwaste Structures Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior Above Grade	Shelter/Protection Structural Support
2	Concrete: Exterior Below Grade	Shelter/Protection Structural Support
3	Concrete: Foundation	Shelter/Protection Structural Support
4	Concrete: Interior	Shelter/Protection Structural Support
5	Concrete: Roof Slab	Shelter/Protection Structural Support
6	Masonry Wall	Shelter/Protection Structural Support
7	Steel Components: All Structural Steel	Shelter/Protection Structural Support

2.4.11 AUXILIARY FEEDWATER PUMPHOUSE STRUCTURES (2159)

Structure Description

The Auxiliary Feedwater (AFW) Pumphouse contains the auxiliary feedwater pumps and auxiliary support systems. The AFW Pumphouse is a Seismic Category I safety-related structure.

The AFW Pumphouses (one for each unit) are one-story, rectangular, reinforced concrete structures. They extend 22 feet above grade and are supported on basemat foundations 4 feet below grade. Four interior walls provide separation for the steam and electric driven pumps. Roof hatches allow pump access. Separation walls between pumps and tanks guard against fire, flooding, and heat.

Scope Determination Summary

The AFW pumps provide the safety-related source of makeup water to the steam generators to support decay heat removal and plant cooldown. The Auxiliary Feedwater Pumphouse structure provides shelter and protection of the auxiliary feedwater pumps and auxiliary support systems, including separation and protection of redundant safety trains. The AFW Pumphouse also includes structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. The decay heat removal function of the AFW System, and therefore the supporting structures in the AFW Pumphouse, are also relied upon for VEGP's compliance with the Commission's regulations for SBO, Fire Protection, and ATWS. The AFW Pumphouse also includes fire protection systems and features that support VEGP's 10 CFR 50.48 compliance.

The following 10 CFR 54.4 criteria are met by the Auxiliary Feedwater Pumphouse Structure:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X		X	X	X	

VEGP UFSAR References

The Auxiliary Feedwater Pumphouse Structure is discussed in VEGP UFSAR Section 3.8.4.1, Description of the Structures, and VEGP UFSAR Section 3.8.5.1, Description of the Foundations.

License Renewal Drawings

AX1D45L01

Components Subject to an AMR

A spaces approach is used for the component-level scoping and screening for in-scope structures (unless stated otherwise). Structural elements of the Auxiliary Feedwater Pumphouses are included in scope and evaluated for license renewal irrespective of safety designation or design classification. The AMR evaluations for the supports and structural bulk commodities are provided separately in Section 2.4.12**,** Component Supports and Bulk Commodities.

Table 2.4.11 lists the component types that require aging management review.

Table 3.5.2-11 provides the results of the aging management review.

Table 2.4.11 Auxiliary Feedwater Pumphouse Structure Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Concrete: Exterior Above Grade	Missile Barrier Shelter/Protection Structural Support
2	Concrete: Foundation	Shelter/Protection Structural Support
3	Concrete: Interior	Shelter/Protection Structural Support
4	Concrete: Roof Slab	Missile Barrier Shelter/Protection Structural Support
5	Steel Components: All Structural Steel	Shelter/Protection Structural Support

2.4.12 COMPONENT SUPPORTS AND BULK COMMODITIES

The Component Supports and Bulk Commodities include the following VEGP structures:

- Electrical Raceway Supports (2166)
- HVAC Duct Supports (2167)
- Pipe Supports (2168)
- Pipe Whip Restraints (2169)
- Raceway System (1810)
- Miscellaneous Cranes and Hoists (1022)

In addition, the Component Supports and Bulk Commodities include other support and miscellaneous bulk commodity items typical to the VEGP in-scope structures.

Structure Description

This group includes component support elements and miscellaneous commodities located within in-scope structures. In addition to supports, bulk commodities common to VEGP in-scope structures such as panels and racks, cable trays, conduits, fire barriers, doors and hatches, HVAC louvers and screens, platforms, gratings, equipment pads and foundations, misc. cranes and monorails, roof membranes, are addressed in this section.

The scoping of the supports and bulk commodities within a structure is addressed under the host structure's evaluation for VEGP.

Additional discussion of the in-scope support features is provided below.

Supports – General Discussion:

Physical interfaces exist with the structure, system or component being supported and with the building structural element to which the support is anchored. A primary function of a support is to provide anchorage of the supported element for design basis events so the supported element can perform its intended function. The in-scope items include support members, welds, bolted connections, anchorage (including base plate and grout) to the building structure, spring hangers, guides, vibration isolators and building concrete at bolt/anchorage locations.

Additional discussion on the following component support elements follows:

- Supports for Major RCS Components
- Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing
- Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation
- Supports for Emergency Diesel Generator, HVAC System Components, and Other Miscellaneous Equipment
- Supports for Platforms, Pipe Whip Restraints, Jet Impingement Shields, and Other Miscellaneous Structures

<u>Supports for Major RCS Components</u>

This group includes the supports and support anchorage for ASME code class piping and components, such as pumps and heat exchangers. Components evaluated in this group include support structural members, welds, bolting, etc., that comprise the interface between the structure and the mechanical component.

The reactor pressure vessel is supported by four seats under two hot leg and two cold leg nozzles which are spaced approximately 90º apart in the primary shield wall. The vertical loads are carried by the support seats to the embedded steel weldments under each support, while the radial and tangential loads are carried by the embedded steel weldments in the primary shield wall.

The steam generator is vertically supported by four steel columns. A lower lateral component support is supplied by bearing blocks and a steel beam which spans the inside of the walls. The upper lateral component support consists of a bearing ring located near the center of gravity of the steam generator.

Each reactor coolant pump support consists of three structural steel columns and lateral tie rods. The pressurizer is supported on a steel ring bearing plate bolted to the flange of the pressurizer support skirt. This ring, in turn, rests on a structural steel frame which is attached to steel embeds in the pressurizer compartments walls. The pressurizer is also supported laterally at an upper level by four stops projecting from embeds within the pressurizer compartment walls.

<u>Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, and Instrument Tubing</u>

This group includes the supports and support anchorage for cable trays, conduits, HVAC ducts, tube track, and instrument tubing. Components evaluated in this group include cable trays, conduits, HVAC ducts, and their structural support members, welds, bolting, etc., that comprise the interface between the structure and the mechanical, electrical, or instrument component.

Supports for Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation

This group includes the supports and support anchorage for enclosures of various types that contain and support electrical equipment. Components evaluated in this group include support structural members, welds, bolting, etc., that comprise the interface between the structure and the electrical or instrument component.

Supports for Emergency Diesel Generator (EDG), HVAC System Components, and Other Miscellaneous Equipment

This group includes the supports and support anchorage for equipment not addressed in previous groups, such as the diesel generators and HVAC fans. Components evaluated in this group include support structural members, welds, bolting, etc., that comprise the interface between the structure and the component. Vibration isolation components are evaluated in this group due to the nature of the supported equipment.

Supports for Platforms, Pipe Whip Restraints, HELB Barriers, and Other Miscellaneous Structures

This group includes the structure and anchorage for miscellaneous support structures as described above that are not included in the other support categories. Included within the component type are the support structural members, welds, bolting, etc., that comprise the support structure and its anchorage.

Scope Determination Summary

In general, the supports and bulk commodities within a structure that are included in the scope of license renewal for VEGP are determined under the individual structure's description. The Component Supports and Bulk Commodities include structures and supports for safety-related SSCs, as well as structures and supports for nonsafety-related SSCs that must be maintained such that safety-related equipment is not affected. Also, some structural commodities and supports for SSCs in the Component Supports and Bulk Commodities are relied upon for VEGP's compliance with the Commission's regulations on Station Blackout, Fire Protection, and ATWS.

The following 10 CFR 54.4 criteria are met by Component Supports and Bulk Commodities						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X		

VEGP UFSAR References

Reactor Vessel Supports, Pressurizer Supports, Steam Generator Supports and Reactor Coolant System Supports are discussed in the following UFSAR sections:

- Section 3.8.3.1, Description of the Internal Structures;
- Section 5.4.14, Component Supports;
- Section 3.9.B.3, ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structure ,
- Section 3.8.3.1.1, Reactor Pressure Vessel Support System;
- Section 3.8.3.1.2, Steam Generator Support System;
- Section 3.8.3.1.6, Pressurizer Supports.
- Section 3.6.1.3.2, Postulated Piping Failures in Fluid Systems Inside and Outside Containment- Protection Mechanisms
- Section 3.6.2.3.3, Types of Pipe Whip Restraints
- Section 3.6.2.4, Protective Assembly Design Criteria
- Section 3F.3, Hazards Analysis – Protection Mechanisms

License Renewal Drawings

None

Components Subject to an AMR

Table 2.4.12 lists the component types that require aging management review.

Table 3.5.2-12 provides the results of the aging management review.

Table 2.4.12 Component Supports and Bulk Commodities Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Battery Racks	Structural Support
2	Cable Tray	Shelter/Protection Structural Support
3	Compressible Joints and Seals	Fire Barrier Flood Barrier Shelter/Protection

Table 2.4.12 (Cont'd) Component Supports and Bulk Commodities Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
4	Concrete: Equipment Pads, Foundations, Pedestals	Structural Support
5	Concrete: Building concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (ASME Piping and Component Supports)	Structural Support
6	Concrete: Building concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Cable Tray, Conduit, HVAC, Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components)	Structural Support
7	Concrete: Building concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Concrete - Racks, Panels, etc.)	Structural Support
8	Concrete: Building concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (EDG, HVAC, Mech Eqpmt, etc.)	Structural Support
9	Concrete: Building concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Platforms, PW Restraints, etc.)	Pipe Whip Restraint Shelter/Protection Structural Support
10	Conduits	Shelter/Protection
11	Doors, Hatches	Shelter/Protection
12	Fire Barrier - Radiant Energy Shields	Fire Barrier
13	Fire Barrier - Structural Steel - w/sprayed-on or Trowelled-on Fire Resistive Coatings	Fire Barrier
14	Fire Boundaries: Concrete Elements and Plaster Walls (Includes Gypsum Board)	Fire Barrier
15	Fire Boundaries: Masonry	Fire Barrier

Table 2.4.12 (Cont'd) Component Supports and Bulk Commodities Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
16	Fire Boundaries: Doors	Fire Barrier Shelter/Protection
17	Fire Barrier Assemblies	Fire Barrier
18	Fire-Boundary Penetration Seals, Seismic Gap Fire Seals	Fire Barrier
19	HELB Barriers (includes Jet Impingement Shields, Whip Restraint, etc.)	HE/ME Shielding Pipe Whip Restraint
20	HVAC Louvers and Screens	Debris Protection
21	Miscellaneous Cranes including Monorails	Structural Support
22	Missile Shields	Missile Barrier
23	Penetration Seals (non-fire barrier)	Flood Barrier Pressure Boundary Shelter/Protection
24	Penetration Sleeves	Shelter/Protection
25	Plant Vent Stack	Flow Distribution Structural Support
26	Platforms, Gratings, Stairways & Other Misc Steel Structures	Shelter/Protection Structural Support
27	Racks, Panels, Cabinets, Frames, & Enclosures	Shelter/Protection
28	Roof Membrane	Shelter/Protection Structural Support
29	Steel Components: All Steel Commodities	Structural Support
30	Supports - Sliding Surfaces	Structural Support
31	Supports for ASME Piping and Components (IWF scope): Constant and variable load spring hangers; guides; stops	Structural Support

Table 2.4.12 (Cont'd) Component Supports and Bulk Commodities Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
32	Supports for ASME Piping and Components (IWF scope): High Strength Bolting for NSSS Component Supports	Structural Support
33	Supports for ASME Piping and Components (IWF scope): Support members; welds; bolted connections; support anchorage to building structure	Structural Support
34	Supports for Cable Tray, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components: Support Members; welds; bolted connections; support anchorage to building structure	Structural Support
35	Supports for EDGs, HVAC Components, and Misc. Mechanical Equipment: Support Members; welds; bolted connections; support anchorage to building structure	Structural Support
36	Supports for Missile Shields, welds; bolted connections; support anchorage to building structure	Missile Barrier Structural Support
37	Supports for Platforms, Pipe Whip Restraints, HELB Barriers & Misc. Structures: Support members; welds; bolted connections; support anchorage to building structure	Pipe Whip Restraint Shelter/Protection Structural Support
38	Supports for Racks, Panels, Cabinets, etc: Support members; welds; bolted connections; support anchorage to building structure	Shelter/Protection Structural Support
39	Supports for RCS Primary Equipment (includes RPV, SG, Pressurizer, RCP)	Shelter/Protection Structural Support
40	Tube Track	Shelter/Protection Structural Support

2.5 SCOPING AND SCREENING RESULTS - ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) SYSTEMS

2.5.1 SCOPING - PLANT-WIDE ELECTRICAL

System Description

Plant-Wide Electrical is the designation used by VEGP in the license renewal application for the sole purpose of grouping electrical components into one system grouping for scoping, screening, and aging management review. It is not a VEGP system and is not found in the VEGP UFSAR, and is used strictly for convenience in performing electrical AMRs and presenting the results.

The methodology used to identify the electrical and I&C components which require an aging management review is discussed in Section 2.1.3.3. Identification of in-scope electrical and I&C components was performed on a generic component type basis. The electrical and I&C component types associated with the in-scope electrical and I&C systems and in-scope mechanical systems and civil structures, were identified generically. In limited cases, such as restoration of offsite power following a SBO event, component type identification and evaluation was limited to only the in-scope portion of the systems rather than generically. The evaluation boundaries of the offsite power system for the SBO event are described in Section 2.1.2.3.5.

During the scoping phase, it was determined that the following component types do not meet the criteria of 10 CFR 54.4(a):

- Metal Enclosed Bus: An evaluation of metal enclosed bus for VEGP determined that VEGP does not have any metal enclosed bus that supports a license renewal intended function.
- Uninsulated Ground Conductors: Uninsulated ground conductors bond metal raceways, building structural steel, and plant equipment to earth ground through an installed grounding grid. The uninsulated ground conductors are nonsafety-related and provide for personnel and equipment protection. In the event of a fault in an electrical circuit or component, the ground conductors provide a direct path to ground for the fault currents to minimize equipment damage. The ground conductors do not prevent faults and are not required for equipment operation. Failure of a ground conductor cannot affect the accomplishment of any safety functions. Therefore, uninsulated ground 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.

The methodology employed is consistent with the guidance in NEI 95-10.

Scope Determination Summary

The in-scope systems and structures are listed in Table 2.2-1. The electrical and I&C component types for the in-scope systems and structures are in the scope of license renewal for one or more of the criteria indicated in the following table.

The following 10 CFR 54.4 criteria are met by Plant-Wide Electrical:						
(a)(1)	(a)(2)	(a)(3)				
		EQ	SBO	FP	ATWS	PTS
X	X	X	X	X	X	

VEGP UFSAR References

No specific VEGP UFSAR references are associated with this system. Descriptions of the I&C and Electric Power systems can be found in UFSAR Chapter 7 and Chapter 8.

License Renewal Drawings

None

2.5.2 EVALUATION OF ELECTRICAL AND I &C COMPONENT TYPES

Using the “plant spaces” approach, electrical and I&C component types were identified and reviewed as a group regardless of the system assigned to each component. Component types were screened against the “passive” and “long-lived” criteria of 10 CFR 54.21(a)(1)(i) and (ii). The component intended functions were then determined.

2.5.3 APPLICATION OF "PASSIVE" SCREENING CRITERION TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

Following the identification of the electrical/I&C component commodity groups, the criterion of 10 CFR 54.21(a)(1)(i) was applied to identify component commodity groups that perform their intended functions without moving parts or without a change in configuration or properties.

The following electrical/I&C component commodity groups were determined to meet the screening criterion of 10 CFR 54.21(a)(1)(i):

1. Cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.1)
2. Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements (Section 2.5.5.2)
3. Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.3)
4. 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 (Section 2.5.5.4)
5. Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.5)
6. Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.6)
7. Fuse Holders (Not part of a larger assembly): Insulation not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.7)
8. Fuse Holders (Not Part of a Larger Assembly): Metallic clamps (Section 2.5.5.8)
9. High voltage insulators (Section 2.5.5.9)
10. Switchyard bus and connections (Section 2.5.5.10)
11. Transmission conductors and connections (Section 2.5.5.11)
12. Electrical portions of electrical/I&C containment penetration assemblies (Section 2.5.5.12)

2.5.4 APPLICATION OF “LONG LIVED” SCREENING CRITERION TO ELECTRICAL/I&C COMPONENT COMMODITY GROUPS

The 10 CFR 54.21(a)(1)(ii) screening criterion was applied to the specific component commodity groups that remained following application of the 10 CFR 54.21(a)(1)(i) criterion. 10 CFR 54.21(a)(1)(ii) allows the exclusion of those component commodity groups that are subject to replacement based on a qualified life or specified time period. The only electrical/I&C components identified for exclusion by the criterion of 10 CFR 54.21(a)(1)(ii) are electrical components included in the Environmental Qualification (EQ) Program. This is because electrical components included in the EQ Program have defined qualified lives and are replaced prior to the expiration of their qualified lives. No electrical/I&C components within the EQ Program are subject to an AMR in accordance with the screening criterion of 10 CFR 54.21(a)(1)(ii).

2.5.5 DETAILED SCREENING RESULTS

2.5.5.1 Cable Connections (Metallic Parts) not Subject to 10 CFR 50.49 EQ Requirements

Cable connections involve the electrical interconnection of interfaces between separate electrical conductors. Splices are most often used to interface between equipment extension leads and plant field cabling. Cable connections are typically used to connect two or more plant cables via a bolted configuration, provide a termination point to a terminal block, or provide a termination point to a piece of equipment. Cable connections are neither system nor function specific. They are used throughout the plant in safety-related and nonsafety-related applications. They are used in EQ areas and non-EQ areas.

The intended function of cable connections is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals. The component function ensures that power, control, or instrumentation circuitry will be available to essential components by providing the necessary current path. Cable connections not subject to 10 CFR 50.49 requirements are passive, long lived components. Therefore, cable connections not subject to 10 CFR 50.49 requirements meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR.

2.5.5.2 Electrical Equipment Subject to 10 CFR 50.49 Environmental Qualification (EQ) Requirements

As noted in Section 2.5.3 above, electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements has been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), because it is included in the EQ Program and electrical components included in the EQ Program have defined qualified lives and are replaced prior to the expiration of their qualified lives. Therefore, it is not subject to an AMR.

All electrical/I&C containment penetration assemblies are included in the EQ Program. All in-scope electrical cables used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance are included in the VEGP EQ Program. Therefore, the electrical portions of Electrical/I&C containment penetration assemblies and electrical cables used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance have been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), and they are not subject to an AMR.

2.5.5.3 Conductor Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements

The electrical cables and connections commodity group applies to non-EQ power, control, and instrumentation insulated cables and connections. An insulated cable is an assembly of an electrical conductor (e.g., wire) with an insulation covering or a combination of conductors insulated from one another with overall coverings. Connections or terminations are used to connect the cable conductors to other cables or electrical devices. Connections include insulating materials used in connectors, splices, terminal blocks, and fuse holders.

Insulated cables and connections inside the enclosure of an active device (e.g., motor leads and connections, and cables and connections internal to relays, chargers, switchgear, transformers, power supplies, etc.) are maintained along with the other subcomponents and piece-parts inside the enclosure and are not subject to an AMR.

The function of electrical cables and connections is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals. Because of the complexity of determining whether individual insulated cables support a license renewal intended function, all non-EQ insulated cable and connections were conservatively screened as meeting the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR. However, individual circuits were subject to elimination from scope on a case-by-case basis during the AMR evaluation process based on a more detailed evaluation of their intended functions and locations.

2.5.5.4 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

As noted in Section 2.5.5.2 above, in-scope electrical cables used in instrumentation circuits that are sensitive to reduction in conductor insulation resistance have been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), because they are subject to 10 CFR 50.49 requirements and included in the EQ Program. Therefore, they are not subject to an AMR.

2.5.5.5 Conductor Insulation for Inaccessible Medium-Voltage Cables not Subject to 10 CFR 50.49 EQ Requirements

The inaccessible medium-voltage cables commodity group applies to the conductor insulation of non-EQ inaccessible medium-voltage (2kV to 35kV) cables that are normally energized and installed in a continuously wet environment. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. The moisture and voltage exposures described as significant in these definitions, which are based on operating experience and engineering judgment, are not significant for medium-voltage cables that are designed for these conditions (e.g., continuous wetting and continuous energization is not significant for submarine cables).

The function of inaccessible medium-voltage cables is to provide electrical connections to specified sections of an electrical circuit to deliver voltage and current. Inaccessible medium-voltage cables not subject to 10 CFR 50.49 requirements are passive, long lived components. Therefore, inaccessible medium-voltage cables not subject to 10 CFR 50.49 requirements meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR.

2.5.5.6 Connector Contacts for Electrical Connectors Exposed to Borated Water Leakage not Subject to 10 CFR 50.49 EQ Requirements

Cable connections involve the electrical interconnection of interfaces between separate electrical conductors. Splices are most often used to interface between equipment extension leads and plant field cabling. Cable connections are typically used to connect two or more plant cables via a bolted configuration, provide a termination point to a terminal block, or provide a termination point to a piece of equipment. Cable connections are neither system nor function specific. They are used throughout the plant in safety-related and nonsafety-related applications. They are used in EQ areas and non-EQ areas.

The intended function of cable connections is to provide electrical connections to specified sections of an electrical circuit to deliver voltage, current or signals. The component function ensures that power, control, or instrumentation circuitry will be available to essential components by providing the necessary current path. Cable connections not subject to 10 CFR 50.49 requirements are passive, long lived components. Therefore, cable connections not subject to 10 CFR 50.49 requirements meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR.

2.5.5.7 Fuse Holders (Not Part of a Larger Assembly): Insulation not Subject to 10 CFR 50.49 EQ Requirements

Fuse holders are either part of a complex active assembly, part of circuits that perform no license renewal intended function, or are associated with fuses in a stand-alone enclosure that is not part of a larger assembly. The insulating materials in these fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 requirements meet the criteria of 10 CFR 54.21(a)(1). Therefore, these fuse holder insulation materials are subject to an AMR.

2.5.5.8 Fuse Holders (Not Part of a Larger Assembly): Metallic Clamps

Fuse holders with metallic clamps are either part of a complex active assembly, part of circuits that perform no license renewal intended function, or are associated with fuses in a stand-alone enclosure that is not part of a larger assembly. The metallic clamps for the fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 requirements meet the criteria of 10 CFR 54.21(a)(1). Therefore, fuse holders with metallic clamps not subject to 10 CFR 50.49 requirements are subject to an AMR.

2.5.5.9 High Voltage Insulators

This review of high voltage insulators includes only the insulators themselves. The evaluation of the support structures is included as part of the structural scoping review for the Switchyard Structures in Section 2.4.8.

An insulator is an insulating (i.e. non-conducting) material in a form designed to (a) physically support a conductor, and (b) separate the conductor electrically from another conductor or object. The insulators within the scope of this review are those used to support and insulate high voltage electrical components in the switchyards, such as transmission conductors and switchyard bus.

There are two basic types of insulators installed at VEGP: station post insulators, and strain or suspension insulators. Station post insulators are used to support stationary switchyard equipment such as disconnect switches and bus. Multiple station post insulators can be fastened together (end to end) to increase the electrical separation between the electrical component and the supporting structure.

Strain and suspension insulators are smaller than station post insulators and are constructed in a way that allows them to be strung together; different string lengths are used for different separation requirements. They are used in applications where movement of the supported conductor is expected and allowed. Strain and suspension insulators are the same insulators; the difference in name is due to their application. Strain insulators are used to maintain tensional support for a transmission conductor between transmission towers or other supporting structures. Suspension insulators normally hang in a vertical position, maintain the conductor spacing from other objects and are normally only under tension due to the gravity load of the supported conductor and the other insulators in the string. Station post, strain, and suspension insulators are always supported from a structure such as a transmission tower or support pedestal. The insulators serve as an intermediate component between the supporting structure and the switchyard bus or transmission conductor. Switchyard bus and transmission conductors are secured to the high voltage insulators using specifically designed hardware.

High voltage insulators are provided on the circuits used to supply power from the switchyard to plant buses during recovery from an SBO. The function of high voltage insulators is to insulate and support electrical conductors. High voltage insulators are passive, long lived components. Therefore, high voltage insulators meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR.

2.5.5.10 Switchyard Bus and Connections

Switchyard bus is uninsulated, unenclosed, electrical conductor used to electrically connect various elements in the switchyard such as disconnect switches, circuit breakers, transformers, and transmission conductors. This review of switchyard bus and connections includes the switchyard bus, the hardware used to secure the bus to high voltage insulators, and the hardware used to secure connections to cable taps from the bus. Switchyard bus connections to active switchyard equipment such as disconnect switches and circuit breakers are inspected and maintained along with the equipment and are not included in this review.

Switchyard bus provides a path to supply power from the switchyard to plant buses during recovery from an SBO. The function of switchyard bus is to provide electrical connections to specified sections of an electrical circuit to deliver voltage and current. The switchyard bus is a passive, long lived component. Therefore, switchyard bus meets the criteria of 10 CFR 54.21(a)(1) and is subject to an AMR.

2.5.5.11 Transmission Conductors and Connections

Transmission conductors are uninsulated, stranded electrical cables used to electrically connect various elements in the switchyard. Transmission conductors are always supported by a structure such as a transmission tower or strain structure. The transmission conductors are insulated from these support structures by strain or suspension insulators. The transmission conductors are secured to the insulators with specifically designed metal hardware. The scope of review of transmission conductors and connections includes the transmission conductors and the hardware used to secure the conductors to the high voltage insulators.

Transmission conductors provide a path to supply power from the switchyard to plant buses during recovery from an SBO. The function of transmission conductors is to provide electrical connections to specified sections of an electrical circuit to deliver voltage and current. Transmission conductors are passive, long lived components. Therefore, transmission conductors meet the criteria of 10 CFR 54.21(a)(1) and are subject to an AMR.

2.5.5.12 Electrical Portions of Electrical/I&C Containment Penetration Assemblies

As noted in Section 2.5.5.2 above, the electrical portions of Electrical/I&C Containment Penetration Assemblies have been excluded by screening criterion 10 CFR 54.21(a)(1)(ii), because they are included in the EQ Program. Therefore, they are not subject to an AMR.

Components Subject to an AMR

Table 2.5.1 Electrical Component Types Subject to Aging Management Review and their Intended Functions

ID	Component Type	Intended Function
1	Cables Connections (Metallic Parts) not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections
2	Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ Requirements	Provide electrical connections
3	Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections
4	Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections
5	Fuse Holders (Not Part of a Larger Assembly): insulation not subject to 10 CFR 50.49 EQ requirements	Electrical insulation
6	Fuse Holders (Not Part of a Larger Assembly): Metallic Clamps	Provide electrical connections
7	High Voltage Insulators	Insulate and support an electrical conductor
8	Switchyard Bus and Connections	Provide electrical connections
9	Transmission Conductors and Connections	Provide electrical connections

2.6 REFERENCES

1. 10 CFR 54, Requirements for Renewal of Operating Licenses for Nuclear Power Plants, U.S. Nuclear Regulatory Commission.

2. NEI 95-10, Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Rev. 6, Nuclear Energy Institute, June 2005.

3. NUREG 1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, U.S. Nuclear Regulatory Commission, September 2005.

4. NUREG-1801, “Generic Aging Lessons Learned Report,” Volumes 1 and 2, NRC, September 2005.

SECTION 3 Aging Management Review Results

3.0 AGING MANAGEMENT REVIEW RESULTS

Section 3 provides the results of the aging management review for those structures and components that are identified as being subject to an aging management review in Section 2.

The methodology used to perform AMRs is summarized in Subsection 3.0.1 below. The AMRs demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.0.1 AMR METHODOLOGY

VEGP structure and component aging management reviews were performed using a methodology consistent with NEI 95-10, Revision 6.

Where beneficial for the AMR process, VEGP components were grouped into component type groups or, “component groups” within a given VEGP LRA system or structure. For the purposes of aging evaluations, these component groups were sometimes further consolidated based upon distinct combinations of material and environment. These groupings may include various component types from several LRA systems or structures.

The AMR methodology utilized industry reports to identify a set of applicable aging effects for VEGP components and structures.

The components requiring an AMR for each VEGP LRA system or structure were evaluated to determine the applicability of the aging effects identified by the industry report review. The result of this evaluation was a set of aging effects requiring management for each structure, component, or component group. The evaluation addresses differences between the VEGP design, materials of construction, and environment parameters, and the assumptions contained within the industry guidance documents. VEGP plant specific operating experience was also considered in the evaluation.

One or more aging management programs (AMPs) were identified for each component or structure with an aging effect requiring management. The attributes of each AMP were evaluated to ensure that the aging effects will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation. When necessary, existing VEGP programs were enhanced or new VEGP programs were created.

Once the VEGP integrated plant assessment was completed using VEGP plant specific data, comparisons to NUREG-1800, Revision 1 and NUREG-1801, Revision 1 were added. Comparisons to NUREG-1800 and NUREG-1801 are not considered to be integral to the VEGP AMR process, but are provided as a review aid.

3.0.2 AMR RESULTS TABLE STRUCTURE

The major Subsections of Section 3 are:

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.2 Aging Management of Engineered Safety Features Systems

3.3 Aging Management of Auxiliary Systems

3.4 Aging Management of Steam and Power Conversion Systems

3.5 Aging Management of Containments, Structures, and Component Supports

3.6 Aging Management of Electrical and Instrumentation and Controls (I & C) Components

The AMR Results information in Section 3 is presented in the following two table types and in "Further Evaluation" text:

- **Table 3.x.1** – where

  '**3**' indicates the LRA section number,

  '**x**' indicates the subsection number from NUREG-1801, Volume 1, and

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

  For example, in the Reactor Coolant System subsection, this table would be numbered 3.1.1; in the Engineered Safety Features subsection, this table would be numbered 3.2.1, etc. This type of table type will hereafter be referred to as "Table 1." These tables are derived from the corresponding tables in NUREG-1801, Volume 1 and present summary information from the VEGP AMR results.

- **Table 3.x.2-y** – where

  '**3**' indicates the LRA section number,

  '**x**' indicates the subsection number from NUREG-1801, Volume 1,

  '**2**' indicates that this is the second table type in Section 3, and

  '**y**' indicates the system table number.

For example, in the Reactor Vessel, Internals, and Reactor Coolant System subsection, the AMR results for the reactor vessel are presented in Table 3.1.2-1 and the results for the reactor internals are in Table 3.1.2-2. In the ESF subsection, the Containment Spray System AMR results are presented in Table 3.2.2-1 and the Emergency Core Cooling System results are in Table 3.2.2-2. This table type will hereafter be referred to as "Table 2." These tables present the VEGP AMR results.

3.0.2.1 Further Evaluation Text

For Table 1 items where NUREG-1801, Volume 1 recommends "further evaluation," separate text sections are provided. These text sections summarize the VEGP AMR results as they relate to the issue raised in the applicable "further evaluation recommended" section of NUREG-1800. The VEGP LRA "further evaluation" section numbering aligns with the applicable issue text in Section 3 of NUREG-1800.

For example, the first line item in NUREG-1801, Volume 1, Table 2 relates to cumulative fatigue damage of emergency core cooling system pressure boundary components. The "Further Evaluation Recommended" column notes that further evaluation is recommended. Discussion of review requirements for this item is outlined in Section 3.2.2.2.1 of NUREG-1800. Correspondingly, Section 3.2.2.2.1 of the VEGP LRA provides a discussion of the VEGP position and aging management review results for the item. This correlation is maintained for all of the further evaluation items in Sections 3.1 through 3.6 of NUREG-1800.

3.0.2.2 Table 1 Description

The purpose of Table 1 is to describe how the VEGP AMR results align with Tables 1 through 6 in NUREG-1801, Volume 1. These tables are essentially the same as Tables 1 through 6 of NUREG-1801, Volume 1, with the following exceptions:

- The "ID" column is re-labeled "item number" and the number has been expanded to include the Table number.
- The "Type" column has been deleted. Items applicable to BWRs are noted as such.
- The "Related Generic Item" and "Unique Item" columns have been replaced with a single "Discussion" column. The discussion column includes:

    1. Any "Further Evaluation Recommended" information or reference to the location of that information in the LRA "Further Evaluation Text" sections.
    2. Exceptions to NUREG-1801 assumptions.
    3. The name of a plant-specific program being used.
    4. A discussion of how the VEGP AMR result is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may appear inconsistent.
    5. A discussion of how the VEGP AMR result is different from the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent.

3.0.2.3 Table 2 Description

Table 2 provides the results of the aging management reviews for the VEGP systems and structures identified in Section 2 as being subject to aging management review. A Table 2 is provided for each of these systems and structures.

Table 2 consists of an ID column followed by nine columns of AMR results and NUREG-1800/1801 comparison information.

- Column 1 – ID

  Column 1 is a unique identification number assigned to each row to provide a simple means to identify a row during discussion or correspondence.

- Column 2 – Component Type

  Column 2 identifies the component types requiring aging management review from Section 2 of the LRA. Similar to Section 2, component types are listed in alphabetical order.

- Column 3 - Intended Function

  Column 3 identifies the applicable intended function(s) for each component type. Definitions and abbreviations of the intended functions are contained in the Component and Structure Intended Functions Table 2.1.3.

- Column 4 – Material

  Column 4 identifies the material(s) of construction for each component type.

  Where applicable, additional material descriptors are included to clarify material composition or fabrication issues relevant to aging effect determinations. For example, "Zn > 15% is indicated for copper alloys with sufficient zinc content to potentially result in susceptibility to selective leaching. Mechanical system additional material descriptors used in the AMR Results Tables include: Al Alloy > 6% Mg, Gray Cast Iron, Zn > 15%, and ACCW System.

- Column 5 – Environment

  Column 5 identifies the environment(s) to which the component types are exposed. Table 3.0-1, Table 3.0-2, and Table 3.0-3 describe the service environments for mechanical, structural, and electrical components, respectively.

Where applicable, additional environment descriptors are included to clarify environmental factors relevant to aging effect determinations. For example, T > 140 ºF is indicated for stainless steel components exposed to normal operating temperatures above the 140 ºF temperature threshold for cracking due to stress corrosion cracking. Mechanical system additional environmental descriptors used in the AMR Results Tables include: T > 140 °F, T $\geq$ 212 °F, T > 482 °F, Aggressive Chemistry, Borated Water Leakage, Condensation, High ΔP, and Wetted.

- Column 6 - Aging Effect Requiring Management

  Column 6 identifies the aging effect(s) requiring management for each component type, material, and environment combination. The aging effects requiring management are those effects that must be managed to maintain the intended function of the component type for the period of extended operation.

- Column 7 - Aging Management Programs

  Column 7 identifies the aging management program(s) credited to adequately manage the effects of aging such that the intended function of the component type will be maintained for the period of extended operation.

  Note: Columns 2 through 7 of Table 2 constitute the VEGP AMR results. Columns 8 through 10 of Table 2, described below, provide comparison information to relate the VEGP AMR results to NUREG-1801 and provide links to clarifying notations.

- Column 8 - NUREG-1801 Vol. 2 Item

  Column 8 identifies a comparable NUREG-1801, Volume 2 item where one exists for a VEGP AMR results item. If there is not a corresponding NUREG-1801, Volume 2 item, then Column 8 is marked "None."

- Column 9 - Table 1 Item

  Column 9 lists the corresponding line item from Table 1 (LRA Table 3.x.1) for each VEGP AMR results item having a comparable NUREG-1801, Volume 2 item (as shown in Column 8). If a comparison to a NUREG-1801 Volume 2 item does not exist in Column 8, then Column 9 is marked "None."

- Column 10 – Notes

  Column 10 contains notes that describe how each Table 2 item aligns with information in NUREG-1801. The two types of notes are "Standard" and "Plant-Specific."

The Standard notations describe the degree of consistency between the VEGP AMR results item and NUREG-1801. Standard notes are alphabetically labeled notes based on NEI 95-10, Revision 6. Table 3.0-4 lists the Standard notes used in Column 10.

Plant-Specific notes contain VEGP plant-specific information and clarifications of AMR results. Plant-Specific notes are numerically labeled using a number that correlates to the corresponding AMR Results section. For example, Section 3.1 uses “100-Series” numbers and Section 3.2 uses “200-Series” numbers.

The Standard and Plant-Specific notes applicable for LRA Subsections 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6 are shown at the end of each of these Subsections.

3.0.2.4 Table Usage

Table 1

Table 1 Component, Aging Effect / Mechanism, Aging Management Programs, and Further Evaluation columns are taken directly from NUREG-1801, Volume 1. The Discussion column summarizes how the VEGP evaluations and aging management programs align with NUREG-1801, Volume 1.

Table 2

Table 2 contains the VEGP AMR results. Each Table 2 row represents a component type, material, environment, aging effect requiring management, and aging management program combination within a VEGP system or structure. If there is a correlation between a VEGP AMR results item and a NUREG-1801, Volume 2 item, then the NUREG-1801, Volume 2 item will appear in Column 8. If Column 8 is None, a comparable NUREG-1801, Volume 2 item was not identified.

If a NUREG-1801, Volume 2 item is identified in Column 8, a Table 1 row number will be shown in Column 89. The Table 1 row number referenced represents the “roll-up” location for the Table 2 item.

3.0.3 OPERATING EXPERIENCE

VEGP considered site-specific as well as industry operating experience in the determination of aging effects requiring management.

Site: VEGP site-specific operating experience was reviewed. As a minimum, site operating experience from the previous five (5) years was reviewed. The site-specific operating experience included a review of:

- Corrective Action Program Reports,
- Licensee Event Reports,
- Input from System Engineers.

The aging effects requiring management which were identified during this review were documented in the operating experience reports and were addressed during the AMR process. In addition, each aging management program contains a discussion of the operating experience relevant to that program.

Industry: Industry operating experience has been captured in NUREG-1801. An evaluation of industry operating experience published since the effective date of NUREG-1801 was performed to identify any additional aging effects requiring management. No additional aging effects requiring management were identified beyond those identified during the AMR process.

On-Going: On-going review of plant-specific and industry operating experience is performed in accordance with the plant Operating Experience Program and as a part of selected VEGP aging management programs.

3.0.4 REFERENCES

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

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

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

Table 3.0-1 Service Environments for Mechanical Aging Management Reviews

Environment	Description
Air - Dried	Compressed air that has been treated to reduce the dew point well below the system operating temperature so that condensation is not possible.
Air - Indoor	An environment found within environmentally controlled structures. As a minimum, temperatures are controlled to prevent freezing conditions and protection from weathering is provided. The Air - Indoor environment is assumed to contain sufficient moisture to support corrosion processes, but component surfaces are normally dry. Within containment, the average bulk temperature is 120 ºF with 5% - 95% humidity and up to 1 RAD per hour dose rates. The air temperature varies throughout the containment according to location and elevation.
Air - Outdoor	An environment where components are exposed to site ambient conditions including weathering and freezing conditions. The air - outdoor environment is also conservatively defined to include components located in sheltered areas where the component is beneath some type of roof structure or outdoor enclosure (such as a valve box) but is otherwise open to the ambient environment.
Air – Ventilation	Normal environment contained within ventilation system components.
Borated Water	Demineralized water treated with boric acid as a chemical reactivity agent. Other additives include lithium hydroxide to maintain pH and oxygen scavengers such as hydrazine and hydrogen.
Closed-cycle Cooling Water	Demineralized water that is treated with Nitrite and corrosion inhibitors, pH control agents, and biocides; as needed.
Concrete	An environment associated with components embedded in concrete.
Diesel Exhaust	Gases, fluids, particulates present in diesel engine exhaust.
Domestic Water	Filtered and treated water used for potable water and other nonsafety-related uses.

Table 3.0-1 (Cont'd) Service Environments for Mechanical Aging Management Reviews

Environment	Description
Drainage - Clean	An environment used to describe clean drainage consisting of leak-off from equipment drains where the content of the leakage source is known. Clean drainage includes borated water, treated water, or closed-cycle cooling water leak-off. Clean drainage is not expected to contain a significant amount of uncontrolled inputs such as oils or unmonitored water; nor is clean drainage expected to contain a significant amount of contaminants.
Drainage - Dirty	An environment used to describe dirty leakage or leak-off from equipment containing unmonitored liquids or from floor drains. Dirty drainage may contain treated water, borated water, raw waters, or oils. Contaminants are assumed to be present.
Exposed to Weather	An environment applicable to mechanical system insulating materials and associated jacketing. Components in the exposed to weather environment may be subject to significant precipitation and direct sunlight.
Freon	Inert gas commonly used in refrigeration and air conditioning systems.
Fuel Oil	Liquid hydrocarbons used as the primary fuel for the diesel generators. Fuel oil is stored in EDG storage tanks, EDG day tanks, and fire protection diesel fuel oil storage tanks.
Halon	Bromotrifluoromethane (Halon) used as a fire suppression agent.
Hydraulic Fluid	Hydraulic Fluid at VEGP includes phosphate ester based fluids typically used in EHC systems.
Gas - Dried	Non-condensable vapor with a very limited percentage of moisture present. Includes "bottled" gases such as carbon dioxide, hydrogen, nitrogen, and oxygen.
Gas – Miscellaneous	Miscellaneous gas environment for use when the gas environment does not fit into any other air or gas category. Examples of the gas – miscellaneous environment include gas sample lines from the Volume Control Tank and Recycle Holdup Tank.
Lube Oil	Low to medium viscosity fluids used to reduce friction between moving parts, e.g., bearing, gear, and engine lubrication.

Table 3.0-1 (Cont'd) Service Environments for Mechanical Aging Management Reviews

Environment	Description
Protected from Weather	An environment applicable to mechanical system insulating materials and associated jacketing. Components in the protected from weather environment are not exposed to significant precipitation or direct sunlight.
Raw Water - Nuclear Service Cooling Water (NSCW)	Water treated with oxidizing biocides and copper corrosion inhibitor. Make-up water may be supplied from River Water or Well Water. The Raw Water - NSCW environment is associated only with the VEGP safety-related cooling towers.
Raw Water - River Water	Water drawn from the Savannah River without mechanical filtration or chemical treatment; other than biocidal treatment. Raw water may contain silt or organic matter.
Raw Water - Well Water	Water drawn from deep wells on site.
Silicone Fluid	An environment describing silicone based fluids associated with containment pressure and reactor vessel level sensing equipment.
Soil	An environment associated with components buried in soil or controlled backfill. The soil environment includes the effects of exposure to groundwater.
Steam	Steam subject to PWR secondary plant water chemistry program controls. The steam environment definition includes the potential for condensation and the resulting pockets of treated water at system low points.
Treated Water	Demineralized water, potentially with additional treatments such as pH control agents, corrosion inhibitors, biocides, or de-aeration. Feedwater and Condensate are considered to be treated water. Closed-cycle cooling water is specifically excluded from this environment.
Treated Water & Steam	A combination environment used to describe the environment applicable to some steam generator components. See the Treated Water and Steam environment descriptions.

Note Mechanical system environmental descriptors used in the AMR Results Tables include: $T > 140$ °F, $T \geq 212$ °F, $T > 482$ °F, Aggressive Chemistry, Borated Water Leakage, Condensation, High ΔP, and Wetted.

Table 3.0-2 Service Environments for Structural Aging Management Reviews

Environment	Description
Air - Indoor	An environment found within environmentally controlled structures. As a minimum, temperatures are controlled to prevent freezing conditions and protection from weathering is provided. The Air - Indoor environment is assumed to contain sufficient moisture to potentially support corrosion processes, but component surfaces are normally dry.
Air - Outdoor	An environment where components are exposed to site ambient conditions including weathering and freezing conditions. The air - outdoor environment is also conservatively defined to include components located in sheltered areas where the component is beneath some type of roof structure or outdoor enclosure (such as a valve box) but is otherwise open to the ambient environment.
Air with Borated Water Leakage	An environment applicable to components in the Air - Indoor or Air - Outdoor environments where potential exposure to borated water leakage is an additional concern. This environment is specified in the VEGP aging management review results only for materials susceptible to boric acid corrosion (e.g. carbon steels, cast irons, copper alloys).
Borated Water	Demineralized water treated with boric acid as a chemical reactivity agent. Other additives include lithium hydroxide to maintain pH and oxygen scavengers such as hydrazine and hydrogen.
Raw Water	Untreated water without mechanical filtration or chemical treatment. Raw water may contain silt or organic matter.
Raw Water - Nuclear Service Cooling Water	Water treated with oxidizing biocides and copper corrosion inhibitor. Make-up water may be supplied from River Water or Well Water. Raw Water - NSCW is associated only with the VEGP safety-related cooling towers.
Soil Below Grade	Environments associated with components buried in soil or controlled backfill. The soil environment includes the effects of exposure to groundwater.
Water - Standing	Groundwater that is stagnant and un-refreshed, thus possibly resulting in increased ionic strength of solution up to saturation.

Table 3.0-3 Service Environments for Electrical Aging Management Reviews

Environment	Description
Air with Borated Water Leakage	An environment applicable to components in the Air - Indoor or Air - Outdoor environments where potential exposure to borated water leakage is an additional concern. This environment is specified in the VEGP aging management review results only for materials susceptible to boric acid corrosion (carbon steels, cast irons, copper alloys).
Air - Indoor	An environment found within VEGP structures. As a minimum, temperatures are controlled to prevent freezing conditions and protection from weathering is provided. The Air - Indoor environment is assumed to contain sufficient moisture to potentially support corrosion processes, but component surfaces are normally dry. If the ambient temperature is < 95 °F, then any resultant thermal aging of organic materials can be considered to be insignificant, over the 60-year period of interest.
Air - Outdoor	An environment where components are exposed to site ambient conditions including weathering and freezing conditions. The Air - Outdoor environment is also conservatively defined to include components located in sheltered areas where the component is beneath some type of roof structure or outdoor enclosure (such as a valve box) but is otherwise exposed to the site ambient conditions.
Air - Indoor and Outdoor	The environment of Air – Indoor and Outdoor is a combination environment comprising the environments of Air – Indoor and Air – Outdoor. See Air - Indoor and Air - Outdoor above.
Adverse Localized Environment Caused by Heat, Radiation, or Moisture, in the Presence of Oxygen	An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. The conductor insulation used for electrical cables can be subjected to an adverse localized environment. This can be caused by heat, radiation, or moisture, in the presence of oxygen.
Adverse Localized Environment Caused by Exposure to Moisture and Voltage	An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. The conductor insulation used for electrical cables can be subjected to an adverse localized environment. This can be caused by exposure to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time.

Table 3.0-4 LRA Table 2 Lettered Notes (Standard Notes)

Note Designator	Note Wording in LRA
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.
I	Aging effect in NUREG-1801 for this component, material, and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

3.1.1 INTRODUCTION

This section provides the results of the aging management review of the reactor vessel, internals, reactor coolant system, and steam generator components and component groups identified in Tables 2.3.1.1 through 2.3.1.4. The following systems are addressed in this system group (with the applicable Section 2 reference in parentheses):

- Reactor Vessel (Section 2.3.1.1)
- Reactor Vessel Internals (Section 2.3.1.2)
- Reactor Coolant System and Connected Lines (includes the Reactor Coolant Pumps) (Section 2.3.1.3)
- Pressurizer (Section 2.3.1.4)
- Steam Generators (Section 2.3.1.5)

Table 3.1.1, Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801, provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for reactor vessel, internals, reactor coolant, pressurizer, and steam generator systems components and component groups that are relied on for license renewal. Text addressing summary items requiring further evaluation is provided in Section 3.1.2.2.

The format and usage of this Table and the associated further evaluation text is described in Section 3.0.2.

3.1.2 RESULTS

The following tables summarize the results of the aging management evaluations for the reactor vessel, internals, reactor coolant system, and steam generator components and component groups:

Table 3.1.2-1	Reactor Vessel – Summary of Aging Management Review
Table 3.1.2-2	Reactor Vessel Internals – Summary of Aging Management Review
Table 3.1.2-3	Reactor Coolant System and Connected Lines – Summary of Aging Management Review
Table 3.1.2-4	Pressurizer – Summary of Aging Management Review
Table 3.1.2-5	Steam Generators – Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the reactor coolant systems in the following Sections:

- Reactor Vessel (Section 3.1.2.1.1)
- Reactor Vessel Internals (Section 3.1.2.1.2)
- Reactor Coolant System and Connected Lines (includes the Reactor Coolant Pumps and Pressurizer) (Section 3.1.2.1.3)
- Pressurizer (Section 3.1.2.1.4)
- Steam Generators (Section 3.1.2.1.5)

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

3.1.2.1.1 *Reactor Vessel Aging Management Review Results*

Materials

The materials of construction for the reactor pressure vessel (RPV) and associated pressure boundary components subject to aging management review are:

- Alloy Steel
- Alloy Steel (with Stainless Steel Cladding)
- Carbon Steel
- Nickel Alloy
- Stainless Steel

Environments

The RPV and associated pressure boundary components are exposed to the following environments:

- Air - Indoor
- Borated Water

Aging Effects Requiring Management

The following aging effects associated with the RPV and associated pressure boundary components require management:

- Cracking – SCC
- Loss of Fracture Toughness
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Wear
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the RPV and associated pressure boundary components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Inservice Inspection Program (Appendix B.3.13)
- Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations (Appendix B.3.15)
- Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14)
- Reactor Vessel Closure Head Stud Program (Appendix B.3.23)
- Reactor Vessel Internals Program (Appendix B.3.24)
- Reactor Vessel Surveillance Program (Appendix B.3.25)
- Water Chemistry Control Program (Appendix B.3.28)

3.1.2.1.2 *Reactor Vessel Internals Aging Management Review Results*

Materials

The materials of construction for the reactor vessel internals components subject to aging management review are:

- Cast Austenitic Stainless Steel (CASS)
- Nickel Alloy
- Stainless Steel

Environments

The reactor vessel internals components are exposed to the following environments:

- Air - Indoor
- Borated Water

Aging Effects Requiring Management

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

- Change in Dimension
- Cracking – Cyclic Loading
- Cracking – SCC
- Loss of Fracture Toughness
- Loss of Material
- Loss of Material – Wear
- Loss of Preload

Aging Management Programs

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

- Flux Thimble Tube Inspection Program (Appendix B.3.11)
- Reactor Vessel Internals Program (Appendix B.3.24)
- Water Chemistry Control Program (Appendix B.3.28)

3.1.2.1.3 ***Reactor Coolant System And Connected Lines Aging Management Review Results***

Materials

The materials of construction for the Reactor Coolant System and Connected Lines components subject to aging management review are:

- Alloy Steel
- Carbon Steel
- Cast Austenitic Stainless Steel (CASS)
- Stainless Steel

Environments

The Reactor Coolant System and Connected Lines are exposed to the following environments:

- Air - Indoor
- Borated Water
- Closed-Cycle Cooling Water
- Drainage – Dirty
- Gas – Dried
- Lube Oil
- Silicone Fluid
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Reactor Coolant System and Connected Lines require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Cracking
- Loss of Fracture Toughness
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Coolant System and Connected Lines:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- CASS RCS Fitting Evaluation Program (Appendix B.3.5)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Fatigue Monitoring Program (Appendix B.3.38)
- Inservice Inspection Program (Appendix B.3.13)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for ASME Class 1 Small Bore Piping (Appendix B.3.18)
- Water Chemistry Control Program (Appendix B.3.28)

3.1.2.1.4 *Pressurizer Aging Management Review Results*

Materials

The materials of construction for the pressurizer components subject to aging management review are:

- Alloy Steel
- Alloy Steel (with Stainless Steel Cladding)
- Alloy Steel (Stainless Steel Cover)
- Carbon Steel
- Nickel Alloy
- Stainless Steel

Environments

The pressurizer components are exposed to the following environments:

- Borated Water
- Air – Indoor

Aging Effects Requiring Management

The following aging effects associated with the pressurizer components require management:

- Cracking – Cyclic Loading
- Cracking – SCC
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the pressurizer components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Fatigue Monitoring Program (Appendix B.3.38)
- Inservice Inspection Program (Appendix B.3.13)
- Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14)
- Water Chemistry Control Program (Appendix B.3.28)

3.1.2.1.5 *Steam Generator Aging Management Review Results*

Materials

The materials of construction for the steam generator components subject to aging management review are:

- Alloy Steel
- Alloy Steel / Nickel Alloy Clad
- Carbon Steel
- Carbon Steel (with Stainless Steel Insert)
- Carbon Steel (with Stainless Steel Cladding)
- Nickel Alloy
- Nickel Alloy (Chrome Plated)
- Stainless Steel

Environments

The steam generator components are exposed to the following environments:

- Air - Indoor
- Borated Water
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the steam generator components require management:

- Cracking – Cyclic Loading
- Cracking – SCC
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Flow Accelerated Corrosion
- Loss of Material - Wear
- Loss of Preload
- Reduction in Heat Transfer

Aging Management Programs

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

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Fatigue Monitoring Program (Appendix B.3.38)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- Inservice Inspection Program (Appendix B.3.13)
- Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14)
- Steam Generator Tubing Integrity Program (Appendix B.3.26)
- Steam Generator Program for Upper Internals (Appendix B.3.27)
- Water Chemistry Control Program (Appendix B.3.28)

3.1.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Reactor Coolant Systems

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.1.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.1.2.2.1 *Cumulative Fatigue Damage*

NUREG-1800, Section 3.1.2.2.1 identifies cumulative fatigue damage as a TLAA to be evaluated in accordance with 10 CFR 54.21(c)(1).

Consistent with NUREG-1800, VEGP fatigue analyses associated with the reactor vessel, reactor vessel internals, pressurizer, steam generators, and reactor coolant system components are identified as time-limited aging analyses (TLAAs) as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c)(1). Section 4.3.1 describes fatigue TLAA evaluations for reactor vessel, pressurizer, steam generator, and reactor coolant system components. Section 4.3.6 describes the fatigue TLAA evaluation for the reactor vessel internals.

The Fatigue Monitoring Program (Appendix B.3.38) is credited to disposition the fatigue TLAA for some components.

Periodic replacement of steam generator secondary side manway and handhole bolts is managed as a part of the Bolting Integrity Program (Appendix B.3.2). This approach ensures the number of transient cycles remains conservative with respect to the current fatigue analyses. See Section 4.3.5 for additional discussion.

3.1.2.2.2 *Loss of Material due to Pitting and Crevice Corrosion*

(1) NUREG-1800, Section 3.1.2.2.2 (1) relates to loss of material in once-through steam generator shell and BWR reactor vessel components exposed to feedwater and steam.

VEGP is a Westinghouse design PWR with recirculating Model F Steam Generators. Therefore issues related to Once-Through Steam Generators and BWR Reactor Vessel components are not applicable to VEGP.

(2) NUREG-1800, Section 3.1.2.2.2 (2) relates to loss of material in BWR Isolation Condenser components.

This item is not applicable to VEGP. VEGP is a PWR.

(3) NUREG-1800, Section 3.1.2.2.2 (3) relates to loss of material in BWR Reactor Vessel and Reactor Coolant Pressure Boundary components.

This item is not applicable to VEGP. VEGP is a PWR.

(4) NUREG-1800, Section 3.1.2.2.2 (4) relates to loss of material in steam generator upper and lower shells and transition cone exposed to feedwater and steam, and the ability to detect pitting and crevice corrosion based on NRC Information Notice (IN) 90-04, if

general and pitting corrosion of the shell is known to exist. For Westinghouse Model 44 and 51 steam generators, NUREG-1800 includes additional inspection requirements.

VEGP manages loss of material in the steam generator secondary side pressure boundary components with the Water Chemistry Control Program and the Inservice Inspection Program. VEGP has Westinghouse Model F steam generators. Therefore, the additional inspections recommended by NUREG-1800 and NUREG-1801 are not applicable to VEGP. Secondary side steam generator activities provide feedback on secondary side conditions. The conditions described in IN 90-04 have not been associated with the secondary side of the VEGP steam generators. The VEGP Steam Generator Program is a living program that is periodically updated to consider new industry experience or research data. Should information indicating that this issue is of concern for Model F steam generators of similar vintage and with operating history, then the VEGP Steam Generator Program will implement appropriate inspection activities.

3.1.2.2.3 *Loss of Fracture Toughness due to Neutron Irradiation Embrittlement*

(1) NUREG-1800, Section 3.1.2.2.3 (1) identifies neutron irradiation embrittlement as a TLAA to be evaluated for all ferritic materials with an expected neutron fluence greater than 1 x 1017 n/cm2 (E > 1.0 MeV) prior to the period of extended operation.

Consistent with NUREG-1800, Neutron irradiation embrittlement is a TLAA as defined in 10 CFR 54.3 for the reactor vessel intermediate course shells, lower course shells, upper (nozzle) course shells, and the inlet nozzles. Portions of each of these components will reach a fluence equal to or exceeding 1 x 10^{17} n/cm^2 (E > 1.0 MeV) prior to the period of extended operation.

TLAAs are required to be evaluated in accordance with 10 CFR 54.21 (c)(1). VEGP reactor vessel neutron embrittlement TLAAs are evaluated in Section 4.2.

(2) NUREG-1800, Section 3.1.2.2.3 (2) identifies loss of fracture toughness due to neutron irradiation embrittlement as an aging effect requiring management by a reactor vessel surveillance program.

Consistent with NUREG-1800, the VEGP Reactor Vessel Surveillance Program (Appendix B.3.25), as supported by associated TLAA evaluations, manages loss of fracture toughness due to neutron irradiation embrittlement. VEGP reactor vessel components expected to reach a fluence equal to or greater than 1 x 10^{17} n/cm^2 (E > 1.0 MeV) prior to the period of extended operation include the intermediate course shells, lower course shells, upper (nozzle) course shells, and the inlet nozzles.

The last capsules examined for VEGP Units 1 and 2 were exposed to a fluence approximately equal to the expected 60 year operating fluence. Standby surveillance capsules remain in both the Unit 1 and Unit 2 reactor vessels.

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

(1) NUREG-1800 Section 3.1.2.2.4 (1) relates to cracking of BWR top head enclosure vessel flange leak detection lines.

This item is not applicable to VEGP. VEGP is a PWR.

(2) NUREG-1800 Section 3.1.2.2.4 (2) relates to cracking of BWR isolation condenser components exposed to reactor coolant.

This item is not applicable to VEGP. VEGP is a PWR.

3.1.2.2.5 *Crack Growth due to Cyclic Loading*

NUREG-1800 Section 3.1.2.2.5 indicates that crack growth due to cyclic loading could occur in reactor vessel SA 508 Class 2 forgings clad with stainless steel using a high heat input process.

There are no analyses of underclad flaws in the VEGP reactor vessels and therefore no TLAA exists for VEGP.

There are SA-508 Class 2 forgings clad using high heat input processes in the VEGP reactor pressure vessel. However, weld processes used were subject to qualification and performance testing as described in NRC Regulatory Guide 1.43 to ensure that underclad cracking would not occur. NRC Regulatory Guide 1.43 describes acceptable methods for preventing underclad cracking through selection and control of the weld processes used for cladding ferritic steel components with stainless steel.

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

NUREG-1800 indicates that loss of fracture toughness due to neutron irradiation embrittlement and void swelling could occur in stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux.

Consistent with NUREG-1800 VEGP will manage loss of fracture toughness due to neutron irradiation embrittlement and void swelling by (1) participating in industry programs for investigating and managing aging effects on reactor internals; (2) evaluating and implementing the results of the industry programs as applicable to the reactor internals; and (3) submitting an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is included in the description of the Reactor Vessel Internals Program

(Appendix B.3.24) and captured in the UFSAR Supplement description of the program (Appendix A.2.24).

3.1.2.2.7 *Cracking due to Stress Corrosion Cracking*

(1) NUREG-1800 Section 3.1.2.2.7 (1) indicates that a plant-specific program should be provided to manage cracking due to SCC in the stainless steel RPV flange leak detection lines and the bottom mounted instrumentation guide tubes.

VEGP manages cracking in the stainless steel portions of the RPV leakage-monitoring lines with the Water Chemistry Control Program (Appendix B.3.28) and Inservice Inspection Program (Appendix B.3.13). The leakage monitoring lines do not serve a safety-related function and therefore only need be managed to ensure that leakage does not adversely impact other components inside containment.

Also, VEGP manages cracking due to SCC in the bottom mounted instrumentation guide tubes with the Chemistry Control Program and the plant-specific Inservice Inspection Program.

Cracking of the reactor vessel head thermal sleeves is aligned to this summary item as a substitute. Different than NUREG-1801, VEGP manages cracking of these thermal sleeves with only the Water Chemistry Control Program. The thermal sleeves are not highly stressed or irradiated components and as such are not expected to experience cracking due to stress corrosion cracking.

(2) NUREG-1800 Section 3.1.2.2.7 (2) indicates that cracking due to SCC could occur in Class 1 cast austenitic stainless steel piping components exposed to reactor coolant. A plant-specific program should be provided if the cast austenitic stainless steel components do not meet the ferrite and carbon content guidelines of NUREG-0313.

The VEGP reactor coolant loop cast austenitic stainless steel elbows and laterals meet the NUREG-0313 guidelines for ferrite content (> 7.5%), but do not meet the guideline for carbon content (< 0.035%). Consistent with NUREG-1800, VEGP manages cracking of these castings with the Water Chemistry Control Program (Appendix B.3.28) and the plant-specific Inservice Inspection Program (Appendix B.3.13).

3.1.2.2.8 *Cracking due to Cyclic Loading*

(1) NUREG-1800 Section 3.1.2.2.8 (1) relates to cracking of BWR jet pump sensing lines due to cyclic loading.

This item is not applicable to VEGP. VEGP is a PWR.

(2) NUREG-1800 Section 3.1.2.2.8 (2) relates to cracking of BWR isolation condenser components due to cyclic loading.

This item is not applicable to VEGP. VEGP is a PWR.

3.1.2.2.9 *Loss of Preload due to Stress Relaxation*

NUREG-1800 Section 3.1.2.2.9 indicates that loss of preload due to stress relaxation could occur in stainless steel and nickel alloy PWR reactor internals.

Consistent with NUREG-1800, VEGP will manage loss of preload due to stress relaxation by (1) participating in industry programs for investigating and managing aging effects on reactor internals; (2) evaluating and implementing the results of the industry programs as applicable to the reactor internals; and (3) submitting an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is included in the description of the Reactor Vessel Internals Program (Appendix B.3.24) and captured in the UFSAR Supplement description of the program (Appendix A.2.24).

3.1.2.2.10 *Loss of Material due to Erosion*

NUREG-1800, Section 3.1.2.2.10 relates to erosion in steam generator impingement plates.

This item is not applicable to VEGP. The VEGP steam generators do not have impingement plates. The VEGP steam generators use a recirculating feed-ring design to distribute the feedwater.

3.1.2.2.11 *Cracking due to Flow-Induced Vibration*

NUREG-1800, Section 3.1.2.2.11 relates to cracking of BWR stainless steel steam dryers exposed to reactor coolant.

This item is not applicable to VEGP. VEGP is a PWR.

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

NUREG-1800 Section 3.1.2.2.12 indicates that cracking due to SCC and IASCC could occur in stainless steel PWR reactor internals exposed to reactor coolant.

Consistent with NUREG-1800, VEGP will manage cracking due to stress corrosion cracking and irradiation assisted stress corrosion cracking by the Water Chemistry Program (Appendix B.3.28) and by (1) participating in industry programs for investigating and managing

aging effects on reactor internals; (2) evaluating and implementing the results of the industry programs as applicable to the reactor internals; and (3) submitting an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is included in the description of the Reactor Vessel Internals Program (Appendix B.3.24) and captured in the UFSAR Supplement description of the program (Appendix A.2.24).

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

NUREG-1800 Section 3.1.2.2.13 indicates that PWSCC of nickel alloy components, with the exception of the reactor vessel upper head nozzles and penetrations, should be managed by Water Chemistry Control, ASME Section XI inservice inspection, and a commitment to comply with applicable NRC Orders and to implement applicable Bulletins, Generic Letters, and staff-accepted industry guidelines.

VEGP manages PWSCC of bottom mounted instrument penetrations, steam generator drain connections, and butt welds with the Water Chemistry Control Program (Appendix B.3.28), Inservice Inspection Program (Appendix B.3.13), and Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14). The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations includes a commitment to comply with applicable NRC Orders and to implement applicable Bulletins, Generic Letters, and staff-accepted industry guidelines. This commitment is included in the description of the Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14) and captured in the UFSAR Supplement description of the program (Appendix A.2.14).

Different than NUREG-1800, VEGP will manage cracking of the core support lugs and pads with the Water Chemistry Control Program (Appendix B.3.28) and the Reactor Vessel Internals Program (Appendix B.3.24). The Reactor Vessel Internals Program includes commitments to evaluate and implement the results of the industry programs as applicable to the reactor internals; and to submit an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. The requirements of any NRC Orders, Bulletins, or Generic Letters issued applicable to cracking of the core support lugs and pads will be implemented in the Reactor Vessel Internals Program inspection plan submitted to the staff.

Table 3.3.2-27 aligns Sampling System pressurizer and reactor coolant system sample cooler tubing to this summary item as a substitute. The Alloy 600 tubing extending past the shell of the cooler is within the scope of license renewal based on the requirements of 10 CFR 54.4 (a)(2). The Alloy 600 tubing is exposed to high temperature borated water and is welded to the stainless steel Sampling System piping. Cracking of this tubing could occur due to SCC at this welded location. VEGP will manage cracking of these tubes with the Water Chemistry Control Program and One-Time Inspection Program (Appendix B.3.17).

3.1.2.2.14 *Wall Thinning due to Flow-accelerated Corrosion*

NUREG-1800, Section 3.1.2.2.14, relates to wall thinning associated with Information Notice 91-19. IN 91-19 was issued to inform licensees of wall thinning due to flow-accelerated corrosion in Combustion Engineering designed steam generator feedwater inlet rings and supports.

VEGP is a Westinghouse design plant with Model F steam generators. Therefore, the issues associated with IN 91-12 are not directly applicable to VEGP. However, the Steam Generator Upper Internals Program will manage possible wall thinning of the VEGP Steam Generator feedwater distribution assembly and associated supports.

3.1.2.2.15 *Changes in Dimensions due to Void Swelling*

NUREG-1800 indicates that changes in dimension due to void swelling could occur in stainless steel and nickel alloy PWR reactor internal components exposed to reactor coolant.

Consistent with NUREG-1800, VEGP will manage changes in dimension due to void swelling by (1) participating in industry programs for investigating and managing aging effects on reactor internals; (2) evaluating and implementing the results of the industry programs as applicable to the reactor internals; and (3) submitting an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is included in the description of the Reactor Vessel Internals Program (Appendix B.3.24) and captured in the UFSAR Supplement description of the program (Appendix A.2.24).

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

(1) NUREG-1800 Section 3.1.2.2.16 (1) relates to cracking of the Reactor Pressure Vessel CRDM Pressure Housings due to SCC. NUREG-1801 item IV.A2-11 rolls to this further discussion section, although the NUREG-1800 further discussion text does not address CRDM pressure housings. NUREG-1801 indicates that a licensee commitment should be confirmed for nickel alloy CRDM pressure housing materials.

The VEGP CRDM pressure housings (CRDM Adapter, Latch Housing, and Rod Travel Housing) are stainless steel. Therefore, evaluation of commitments related to nickel alloy management is not required.

Cracking due to SCC in the VEGP CRDM Adapters, Latch Housings, and Rod Travel Housings is managed by the Water Chemistry Control Program (Appendix B.3.28) and Inservice Inspection Program (Appendix B.3.13).

The VEGP stainless steel Conoseal Assembly Housings and Core Exit Thermocouple Nozzle Assemblies are also aligned to this item. Cracking due to SCC in these pressure housings is also managed by the Water Chemistry Control Program and Inservice Inspection Program.

Finally, the Reactor Vessel Thermal Sleeves are aligned to this item as a substitute. VEGP manages cracking due to SCC in these sleeves with only the Water Chemistry Control Program.

NUREG-1800 aligns once-though steam generator components (Table 3.1.1 Item 34) to this summary item. VEGP has Westinghouse Model F design recirculating steam generators. Therefore, once-through steam generator items are not applicable to VEGP.

(2) NUREG-1800 Section 3.1.2.2.16 (2) relates to cracking of the Pressurizer Spray Heads due to SCC.

The VEGP Pressurizer Spray Heads are not within the scope of license renewal and therefore this item is not applicable for VEGP.

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

NUREG-1800 Section 3.1.2.2.17 indicates that cracking due to stress corrosion cracking, primary water stress corrosion cracking, and irradiation assisted stress corrosion cracking could occur in stainless steel and nickel alloy PWR reactor internal components exposed to reactor coolant.

Consistent with NUREG-1800, VEGP will manage cracking due to stress corrosion cracking, primary water stress corrosion cracking, and irradiation assisted stress corrosion cracking by the Water Chemistry Program and by (1) participating in industry programs for investigating and managing aging effects on reactor internals; (2) evaluating and implementing the results of the industry programs as applicable to the reactor internals; and (3) submitting an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is included in the description of the Reactor Vessel Internals Program (Appendix B.3.24) and captured in the UFSAR Supplement description of the program (Appendix A.2.24).

3.1.2.2.18 *Quality Assurance for Aging Management of Nonsafety-Related Components*

Quality Assurance Program and Administrative Controls are discussed in Section B.1.3.

3.1.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAAs identified below are associated with the Reactor Vessel, Internals, and Reactor Coolant System components. The LRA section that contains the TLAA review results is indicated in parentheses.

- Neutron Embrittlement (Section 4.2)
- Metal Fatigue (Section 4.3)
- Leak Before Break Analysis (Section 4.7.1)

3.1.3 CONCLUSION

The Reactor Vessel, Internals, and Reactor Coolant System components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with the Reactor Vessel, Internals, and Reactor Coolant System components are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.1.1 Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-1	Steel pressure vessel support skirt and attachment welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This item is not applicable to VEGP. The VEGP reactor pressure vessels are a Westinghouse design without a support skirt. Therefore, the applicable NUREG-1801 line item (IV.A2-20) was not used.
3.1.1-2	BWR Only				
3.1.1-3	BWR Only				
3.1.1-4	BWR Only				
3.1.1-5	Stainless steel and nickel alloy reactor vessel internals components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (See subsection 3.1.2.2.1)	Cumulative fatigue damage is addressed as a TLAA. See Section 3.1.2.2.1 for further discussion.
3.1.1-6	Nickel Alloy tubes and sleeves in a reactor coolant and secondary feedwater/steam environment	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (See subsection 3.1.2.2.1)	Cumulative fatigue damage is addressed as a TLAA. See Section 3.1.2.2.1 for further discussion. Tube sleeves are not currently used in the VEGP steam generators.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-7	Steel and stainless steel reactor coolant pressure boundary closure bolting, head closure studs, support skirts and attachment welds, pressurizer relief tank components, steam generator components, piping and components external surfaces and bolting	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (See subsection 3.1.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. Cracking due to fatigue is an aging effect requiring management for the SG secondary side manway and handhole bolts. These bolts will be replaced to ensure the fatigue usage remains acceptable. See Section 3.1.2.2.1 for further discussion.
3.1.1-8	Steel; stainless steel; and nickel-alloy reactor coolant pressure boundary piping, piping components, piping elements; flanges; nozzles and safe ends; pressurizer vessel shell heads and welds; heater sheaths and sleeves; penetrations; and thermal sleeves	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA (See subsection 3.1.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.1.2.2.1 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-9	Steel; stainless steel; steel with nickel-alloy or stainless steel cladding; nickel-alloy reactor vessel components: flanges; nozzles; penetrations; pressure housings; safe ends; thermal sleeves; vessel shells, heads and welds	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c) and environmental effects are to be addressed for Class 1 components	Yes, TLAA (See subsection 3.1.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.1.2.2.1 for further discussion.
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 (See subsection 3.1.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.1.2.2.1 for further discussion.
3.1.1-11	BWR Only				
3.1.1-12	Steel steam generator shell assembly exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.1.2.2.2.1)	This item is not applicable to VEGP. See Section 3.1.2.2.2(1) for further discussion.
3.1.1-13	BWR Only				

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-14	BWR Only				
3.1.1-15	BWR Only				
3.1.1-16	Steel steam generator upper and lower shell and transition cone exposed to secondary feedwater and steam	Loss of material due to general, pitting and crevice corrosion	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry and, for Westinghouse Model 44 and 51 S/G, if general and pitting corrosion of the shell is known to exist, additional inspection procedures are to be developed.	Yes, detection of aging effects is to be evaluated (See subsection 3.1.2.2.2.4)	VEGP manages loss of material due to corrosion with the Water Chemistry Control Program (Appendix B.3.28) and the plant-specific Inservice Inspection Program (Appendix B.3.13). VEGP has Model F steam generators, so the additional inspection requirements are not applicable. See Section 3.1.2.2.2(4) for further discussion. The steam generator Tubeplate is aligned to this summary item as a substitute. VEGP manages loss of material on the secondary side of the Tubeplate with the Steam Generator Tubing Integrity Program (Appendix B.3.26) in addition to the Water Chemistry Control Program and Inservice Inspection Program.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-17	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 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 (See subsection 3.1.2.2.3.1)	Loss of fracture toughness due to neutron irradiation embrittlement is addressed as a TLAA. See Section 3.1.2.2.3(1) for further discussion.
3.1.1-18	Steel (with or without stainless steel cladding) reactor vessel beltline shell, nozzles, and welds; safety injection nozzles	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance	Yes, plant specific (See subsection 3.1.2.2.3.2)	Consistent with NUREG-1801 with aging management program exception. VEGP manages loss of fracture toughness with the Reactor Vessel Surveillance Program (Appendix B.3.25) See Section 3.1.2.2.3(2) for further discussion.
3.1.1-19	BWR Only				
3.1.1-20	BWR Only				

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 (See subsection 3.1.2.2.5)	This item is not applicable to VEGP. See Section 3.1.2.2.5 for further discussion.
3.1.1-22	Stainless steel and nickel alloy reactor vessel internals components exposed to reactor coolant and neutron flux	Loss of fracture toughness due to neutron irradiation embrittlement, void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed (See subsection 3.1.2.2.6)	Consistent with NUREG-1801. The VEGP UFSAR Supplement includes a commitment for the Reactor Vessel Internals Program. See Section 3.1.2.2.6 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-23	Stainless steel reactor vessel closure head flange leak detection line and bottom-mounted instrument guide tubes	Cracking due to stress corrosion cracking	A plant-specific aging management program is to be evaluated.	Yes, plant specific (See subsection 3.1.2.2.7.1)	Consistent with NUREG-1801 for pressure boundary components. The plant-specific program used to manage these components is a combination of the Water Chemistry Control Program (Appendix B.3.28)and Inservice Inspection Program (Appendix B.3.13). The reactor vessel head thermal sleeves align to this item as a substitute. Different than NUREG-1801, VEGP manages cracking of the non-pressure boundary reactor vessel head thermal sleeves with only the Water Chemistry Control Program. See Section 3.1.2.2.7(1) for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-24	Class 1 cast austenitic stainless steel piping, piping components, and piping elements exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry and, for CASS components that do not meet the NUREG-0313 guidelines, a plant specific aging management program	Yes, plant specific (See subsection 3.1.2.2.7.2)	Consistent with NUREG-1801. VEGP manages cracking due to SCC in Class 1 cast austenitic stainless steel piping components and piping elements exposed to reactor coolant with the Water Chemistry Control Program and the plant-specific Inservice Inspection Program. See Section 3.1.2.2.7(2) for further discussion.
3.1.1-25	BWR Only				
3.1.1-26	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, but licensee commitment to be confirmed (See subsection 3.1.2.2.9)	Consistent with NUREG-1801. The VEGP UFSAR Supplement includes a commitment for the Reactor Vessel Internals Program. See Section 3.1.2.2.9 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, plant specific (See subsection 3.1.2.2.10)	This item is not applicable to VEGP. The VEGP steam generators do not have impingement plates. See Section 3.1.2.2.10 for further discussion.
3.1.1-29	BWR Only				

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-30	Stainless steel reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Baffle/former assembly, Lower internal assembly, shroud assemblies, Plenum cover and plenum cylinder, Upper grid assembly, Control rod guide tube (CRGT) assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly, Thermal shield, Instrumentation support structures)	Cracking due to stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and UFSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed (See subsection 3.1.2.2.12)	Consistent with NUREG-1801. VEGP will manage cracking due to SCC with the Water Chemistry Control Program and Reactor Vessel Internals Program. The VEGP UFSAR Supplement includes a commitment for the Reactor Vessel Internals Program. See Section 3.1.2.2.12 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-31	Nickel alloy and steel with nickel-alloy cladding piping, piping component, piping elements, penetrations, nozzles, safe ends, and welds (other than reactor vessel head); pressurizer heater sheaths, sleeves, diaphragm plate, manways and flanges; core support pads/core guide lugs	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed (See subsection 3.1.2.2.13)	For bottom mounted instrument penetrations, steam generator drain connections, and butt welds, VEGP manages PWSCC with the Water Chemistry Control Program (Appendix B.3.28), Inservice Inspection Program (Appendix B.3.13), and Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14).The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations includes a licensee commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines. Different than NUREG-1801, VEGP manages PWSCC of the core support lugs and pads with the Water Chemistry Control Program (Appendix B.3.28), Inservice Inspection Program (Appendix B.3.13), and Reactor Vessel Internals Program (Appendix B.3.24). Table 3.3.2-27 aligns Sampling System pressurizer and reactor coolant system sample cooler tubing to this summary item as substitutes. The Alloy 600 tubing extending past the shell of the cooler is within the scope of license renewal based on the requirements of 10 CFR 54.4 (a)(2). See Section 3.1.2.2.13 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, plant specific (See subsection 3.1.2.2.14)	Consistent with NUREG-1801. VEGP manages loss of material due to FAC in Steam Generator feedwater distribution assembly components with the Steam Generator Program for Upper Internals (Appendix B.3.27). See Section 3.1.2.2.14 for further discussion. Additionally, the Steam Generator Moisture Separator Assemblies are aligned to the item as a substitute. Loss of material due to FAC in these assemblies is also managed by the Steam Generator Upper Internals Program (Appendix B.3.27).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-33	Stainless steel and nickel alloy reactor vessel internals components	Changes in dimensions due to void swelling	FSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment to be confirmed (See subsection 3.1.2.2.15)	Consistent with NUREG-1801. The VEGP UFSAR Supplement includes a commitment for the Reactor Vessel Internals Program. See Section 3.1.2.2.15 for further discussion.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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) and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed (See subsection 3.1.2.2.16.1)	VEGP manages stress corrosion cracking of the stainless steel CRDM pressure housings, Conoseal assemblies, and core exit thermocouple nozzle assemblies with the Water Chemistry Control Program (Appendix B.3.28) and the Inservice Inspection Program (Appendix B.3.13). See Section 3.1.2.2.16(1) for further discussion. The Reactor Vessel Thermal sleeves are aligned to this summary item as a substitute. Different than NUREG 1801, VEGP manages SCC of the thermal sleeves with only the Water Chemistry Control Program. There are no VEGP nickel alloy components aligned to this line item.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-35	Steel with stainless steel or nickel alloy cladding primary side components; steam generator upper and lower heads, tubesheets and tube-to-tube sheet welds	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and for nickel alloy, comply with applicable NRC Orders and provide a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, but licensee commitment needs to be confirmed (See subsection 3.1.2.2.16.1)	This item is not applicable to VEGP. The VEGP steam generators are a Westinghouse Model F recirculating design. The NUREG-1801 aging management item associated with this summary item is applicable only to once-through steam generators. Also see Section 3.1.2.2.16(1).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-36	Nickel alloy, stainless steel pressurizer spray head	Cracking due to stress corrosion cracking and primary water stress corrosion cracking	Water Chemistry and One-Time Inspection and, for nickel alloy welded spray heads, comply with applicable NRC Orders and provide a commitment in the UFSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines.	No, unless licensee commitment needs to be confirmed (See subsection 3.1.2.2.16.2)	This item is not applicable to VEGP. The VEGP Pressurizer Spray Heads do not perform any license renewal intended function. Also see Section 3.1.2.2.16(2).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-37	Stainless steel and nickel alloy reactor vessel internals components (e.g., Upper internals assembly, RCCA guide tube assemblies, Lower internal assembly, CEA shroud assemblies, Core shroud assembly, Core support shield assembly, Core barrel assembly, Lower grid assembly, Flow distributor assembly)	Cracking due to stress corrosion cracking, primary water stress corrosion cracking, irradiation-assisted stress corrosion cracking	Water Chemistry and UFSAR supplement commitment to (1) participate in industry RVI aging programs (2) implement applicable results (3) submit for NRC approval > 24 months before the extended period an RVI inspection plan based on industry recommendation.	No, but licensee commitment needs to be confirmed (See subsection 3.1.2.2.17)	Consistent with NUREG-1801. VEGP will manage cracking due to SCC with the Water Chemistry Control Program and Reactor Vessel Internals program. The VEGP UFSAR Supplement includes a commitment for the Reactor Vessel Internals Program. See Section 3.1.2.2.17 for further discussion.
3.1.1-38	BWR Only				
3.1.1-39	BWR Only				
3.1.1-40	BWR Only				
3.1.1-41	BWR Only				
3.1.1-42	BWR Only				
3.1.1-43	BWR Only				
3.1.1-44	BWR Only				
3.1.1-45	BWR Only				

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-46	BWR Only				
3.1.1-47	BWR Only				
3.1.1-48	BWR Only				
3.1.1-49	BWR Only				
3.1.1-50	BWR Only				
3.1.1-51	BWR Only				

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-52	Steel and stainless steel reactor coolant pressure boundary (RCPB) pump and valve closure bolting, manway and holding bolting, flange bolting, and closure bolting in high-pressure and high-temperature systems	Cracking due to stress corrosion cracking, loss of material due to wear, loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	VEGP manages reactor coolant pressure boundary bolting cracking, loss of material, and loss of preload with the plant-specific Bolting Integrity Program (Appendix B.3.2). Different than NUREG-1801, VEGP does not include cracking due to SCC for non ASME Class 1 A193 Gr. B7 bolting. CMTRs for a sample population of A193 Gr. B7 bolting used at VEGP have been reviewed and it has been determined that the actual yield strengths of this bolting material do not exceed 150 ksi. VEGP operating experience supports this conclusion. Cracking of ASME Class 1 bolting fabricated from A193 Gr. B7 material is conservatively considered.
3.1.1-53	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages loss of material with the Closed Cooling Water Program (Appendix B.3.6).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-54	Copper alloy piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to VEGP. There are no copper alloy components exposed to closed-cycle cooling water in the VEGP reactor coolant system boundary.
3.1.1-55	Cast austenitic stainless steel Class 1 pump casings, and valve bodies and bonnets exposed to reactor coolant >250°C (>482°F)	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection (IWB, IWC, and IWD). Thermal aging susceptibility screening is not necessary, inservice inspection requirements are sufficient for managing these aging effects. ASME Code Case N-481 also provides an alternative for pump casings.	No	The VEGP Inservice Inspection Program (Appendix B.3.13) manages loss of fracture toughness due to thermal embrittlement of the VEGP reactor coolant pump casings and reactor coolant system valve bodies. This conclusion is consistent with the May 9, 2000 NRC letter regarding thermal aging embrittlement of cast austenitic stainless steel components.
3.1.1-56	Copper alloy >15% Zn piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to VEGP. There are no copper alloy (> 15% Zn) components in the VEGP reactor coolant system boundary.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Consistent with NUREG-1801 with aging management program exception. VEGP castings determined to be susceptible to thermal aging embrittlement include only the Unit 1 (Loop 4) RCP Inlet Elbow and the Unit 2 (Loop 1) RCP Inlet Elbow. Other cast austenitic stainless steel piping components have been screening using a methodology consistent with the methodology described in NUREG-1801, Section XI.M12. For the castings identified above, VEGP will manage loss of fracture toughness due to thermal aging embrittlement with the RCS CASS Fitting Evaluation Program (Appendix B.3.5).
3.1.1-58	Steel reactor coolant pressure boundary external surfaces exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801. VEGP manages loss of material due to boric acid corrosion with the Boric Acid Corrosion Control Program (Appendix B.3.3).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exception. VEGP manages FAC in the Feedwater Inlet Nozzle with the Flow Accelerated Corrosion Program (Appendix B.3.10). Different than NUREG-1801, the VEGP AMR results do not include loss of material due to FAC for the Auxiliary Feedwater Nozzle or the Steam Outlet Nozzle. The VEGP Steam Generator Feedwater Inlet Nozzles do not have associated safe ends.
3.1.1-60	Stainless steel flux thimble tubes (with or without chrome plating)	Loss of material due to Wear	Flux Thimble Tube Inspection	No	Consistent with NUREG-1801. VEGP manages flux thimble tube wear with the Flux Thimble Tube Inspection Program (Appendix B.3.11)

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-61	Stainless steel, steel pressurizer integral support exposed to air with metal temperature up to 288°C (550°F)	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	This item is not applicable to VEGP. The NUREG-1801 Volume 2 AMR line item associated with this item is for a Pressurizer Integral Support. The VEGP Pressurizer Support Skirt and Flange is not subject to cracking due to cyclic loading. Management of cracking due to cumulative fatigue damage is described in Item 3.1.1-7 and Section 3.1.2.2.1.
3.1.1-62	Stainless steel, steel with stainless steel cladding reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings exposed to reactor coolant	Cracking due to cyclic loading	Inservice Inspection (IWB, IWC, and IWD)	No	Different than NUREG-1801. VEGP manages cracking due to cyclic loading with the Fatigue Monitoring Program (Appendix B.3.38) and the Inservice Inspection Program (Appendix B.3.13).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-63	Steel reactor vessel flange, stainless steel and nickel alloy reactor vessel internals exposed to reactor coolant (e.g., upper and lower internals assembly, CEA shroud assembly, core support barrel, upper grid assembly, core support shield assembly, lower grid assembly)	Loss of material due to Wear	Inservice Inspection (IWB, IWC, and IWD)	No	VEGP manages wear of the reactor vessel flange and reactor vessel closure head flange with the Inservice Inspection Program (Appendix B.3.13). Different than NUREG-1801, for reactor vessel internals components (*including; Clevis Inserts and Fasteners, CRGT Assemblies, CRGT Support Pins, Head / RPV Alignment Pins, Lower Core Plate and Fuel Alignment Pins, Radial Support Keys, Upper Core Plate and Fuel Alignment Pins, and Upper Core Plate Alignment Pins*) VEGP will manage wear by implementing the commitment specified in the program description of the Reactor Vessel Internals Program (Appendix B.3.24). This commitment is captured in the VEGP UFSAR Supplement for the Reactor Vessel Internals Program (Appendix A.2.24).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-64	Stainless steel and steel with stainless steel or nickel alloy cladding pressurizer components	Cracking due to stress corrosion cracking, primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry	No	VEGP manages cracking due to SCC of the stainless steel Pressurizer Nozzle Safe Ends (Relief, Safety, Spray, and Surge Nozzles) and Instrument Penetrations with the Water Chemistry Control Program (Appendix B.3.28) and Inservice Inspection Program (Appendix B.3.13). There are no VEGP nickel alloy Pressurizer components associated with this summary item.
3.1.1-65	Nickel alloy reactor vessel upper head and control rod drive penetration nozzles, instrument tubes, head vent pipe (top head), and welds	Cracking due to primary water stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD) and Water Chemistry and Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	No	VEGP manages PWSCC of the reactor vessel closure head nickel alloy penetrations with the Water Chemistry Control Program (Appendix B.3.28), Inservice Inspection Program (Appendix B.3.13), and Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations (Appendix B.3.15).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-66	Steel steam generator secondary manways and handholds (cover only) exposed to air with leaking secondary-side water and/or steam	Loss of material due to erosion	Inservice Inspection (IWB, IWC, and IWD) for Class 2 components	No	This line item is not applicable to VEGP. The VEGP steam generators are a recirculating design, not a once-through design. Therefore, the associated NUREG-1801 line item (R-31) 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), and Water Chemistry	No	Different than NUREG-1801. VEGP manages cracking of Pressurizer components due to cyclic loading with a combination of the Inservice Inspection Program (Appendix B.3.13) and the Fatigue Monitoring Program (Appendix B.3.38). The VEGP Fatigue Monitoring Program includes stress-based fatigue monitoring of the Pressurizer Lower Head and Surge Nozzle region components. Water chemistry control is not credited to mitigate cracking due to cyclic loading.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-68	Stainless steel, steel with stainless steel cladding Class 1 piping, fittings, pump casings, valve bodies, nozzles, safe ends, manways, flanges, CRD housing; pressurizer heater sheaths, sleeves, diaphragm plate; pressurizer relief tank components, reactor coolant system cold leg, hot leg, surge line, and spray line piping and fittings	Cracking due to stress corrosion cracking	Inservice Inspection (IWB, IWC, and IWD), and Water Chemistry	No	VEGP manages cracking due to SCC in stainless steel pressure boundary components with the Water Chemistry Control Program (Appendix B.3.28) and Inservice Inspection Program (Appendix B.3.13). Different than NUREG-1801, Cracking due to stress corrosion cracking was not identified as an aging effect requiring management for the alloy steel Pressurizer components (Shells, Upper Head, and Lower Head) or for the carbon steel Steam Generator Primary side components (Primary Channel Head with Integral Primary Nozzles and Manway, Manway Covers).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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), and Water Chemistry	No	VEGP manages cracking due to SCC in the SS RPV Inlet and Outlet Nozzle Safe Ends with the Water Chemistry Control Program (Appendix B.3.28) and Inservice Inspection Program (Appendix B.3.13). VEGP manages cracking due to PWSCC in the RPV Inlet and Outlet Nozzle to Safe End Dissimilar Metal Welds with the Water Chemistry Control Program, Inservice Inspection Program, and Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations (Appendix B.3.14). The Nickel Alloy Mgmt Program for Non-RV Closure Head Penetration Locations includes a commitment to comply with applicable NRC Orders and to implement applicable (1) Bulletins and GLs and (2) staff-accepted industry guidelines which is captured in the UFSAR supplement for the program (Appendix A.2.14). The VEGP RPVs do not have Safety Injection Nozzles.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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), Water chemistry, and One-Time Inspection of ASME Code Class 1 Small-bore Piping.	No	VEGP manages cracking due to SCC with the Water Chemistry Control Program (Appendix B.3.28), Inservice Inspection Program (Appendix B.3.13), and the One-Time Inspection Program for ASME Class 1 Small-Bore Piping (Appendix B.3.18). VEGP manages cracking due to cyclic loading with the Fatigue Monitoring Program (Appendix B.3.38), Inservice Inspection Program (Appendix B.3.13), and the One-Time Inspection Program for ASME Class 1 Small-Bore Piping (Appendix B.3.18).
3.1.1-71	High-strength low alloy steel closure head stud assembly exposed to air with reactor coolant leakage	Cracking due to stress corrosion cracking; loss of material due to wear	Reactor Head Closure Studs	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages wear of the reactor vessel closure stud assemblies with the Reactor Vessel Closure Stud Program (Appendix B.3.23).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-72	Nickel alloy steam generator tubes and sleeves exposed to secondary feedwater/ steam	Cracking due to OD stress corrosion cracking and intergranular attack, loss of material due to fretting and wear	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages cracking of steam generator tubes due to SCC and intergranular attack with the Water Chemistry Control Program (Appendix B.3.28) and Steam Generator Tubing Integrity Program (Appendix B.3.26). VEGP does not credit the Water Chemistry Control Program to manage fretting and wear of steam generator tubes. Only the Steam Generator Tubing Integrity Program is credited to manage this aging effect. Steam generator tube plugs are also aligned to this summary item for the aging effect of cracking since tube plugs are also exposed to the secondary side environment. Loss of material due to fretting and wear is not considered plausible for steam generator tube plugs.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-73	Nickel alloy steam generator tubes, repair sleeves, and tube plugs exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Steam Generator Tube Integrity and Water Chemistry	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages cracking due to SCC with the Water Chemistry Control Program (Appendix B.3.28) and Steam Generator Tubing Integrity Program (Appendix B.3.26).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-74	Chrome plated steel, stainless steel, nickel alloy steam generator 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 and Water Chemistry	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages cracking due to SCC with the Water Chemistry Control Program (Appendix B.3.28) and Steam Generator Tubing Integrity Program (Appendix B.3.26). VEGP does not credit the Water Chemistry Control Program to manage fretting of the anti-vibration bars. Only the Steam Generator Tubing Integrity Program is credited to manage this aging effect. The steam generator Auxiliary Feedwater Nozzle Thermal Sleeve, Feedwater J-Tubes, and Steam Outlet Flow Limiter are aligned to this item as substitutes. VEGP manages cracking of the Feedwater Nozzle Thermal Sleeve and Feedwater J-Tubes with the Water Chemistry Control Program and Steam Generator Upper Internals Program (Appendix B.3.27). Cracking of the Steam Outlet Flow limiter is managed by the Water Chemistry Control Program alone.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-75	Nickel alloy once-through steam generator tubes exposed to secondary feedwater/ steam	Denting due to corrosion of carbon steel tube support plate	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to VEGP. The VEGP steam generators are a recirculating design, not a once-through design. Further, the VEGP steam generator tube support plates are fabricated from type 405 ferritic stainless steel, not carbon steel. Therefore, the associated NUREG-1801 line item was not used.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-76	Steel steam generator tube support plate, tube bundle wrapper exposed to secondary feedwater/ steam	Loss of material due to erosion, general, pitting, and crevice corrosion, ligament cracking due to corrosion	Steam Generator Tube Integrity and Water Chemistry	No	For the tube bundle wrapper and support assembly, consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and Steam Generator Tubing Integrity Program (Appendix B.3.26). The VEGP Steam Generator Moisture Separator Assemblies are aligned to this item as a substitute. VEGP manages loss of material in the Steam Generator Moisture Separator Assemblies with the Water Chemistry Control Program and the Steam Generator Program for Upper Internals (Appendix B.3.27). For tube support plates, this line item is not applicable. The VEGP Model F steam generator tube support plates are fabricated from type 405 stainless steel, not carbon steel. As such, this degradation mode is not applicable to VEGP.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-77	Nickel alloy steam generator tubes and sleeves exposed to phosphate chemistry in secondary feedwater/ steam	Loss of material due to wastage and pitting corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to VEGP. VEGP does not use phosphate chemistry. Therefore, the associated NUREG-1801 line item was not used.
3.1.1-78	Steel steam generator tube support lattice bars exposed to secondary feedwater/ steam	Wall thinning due to flow-accelerated corrosion	Steam Generator Tube Integrity and Water Chemistry	No	This item is not applicable to VEGP. The VEGP steam generators do not include lattice support bars. Therefore, the associated NUREG-1801 line item 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; Water Chemistry and, for plants that could experience denting at the upper support plates, evaluate potential for rapidly propagating cracks and then develop and take corrective actions consistent with Bulletin 88-02.	No	This item is not applicable to VEGP. The VEGP steam generator tube support plates are fabricated from type 405 ferritic stainless steel. Therefore, the associated NUREG-1801 line item was not used.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-80	Cast austenitic stainless steel reactor vessel internals (e.g., upper internals assembly, lower internal assembly, CEA shroud assemblies, control rod guide tube assembly, core support shield assembly, lower grid assembly)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement of CASS	No	Different than NUREG-1801. The bottom mounted instrumentation column cruciforms are the only austenitic stainless steel castings used in the VEGP reactor vessel internals. For these castings, VEGP will manage loss of fracture toughness due to thermal aging and neutron irradiation embrittlement with the Reactor Vessel Internals Program (Appendix B.3.24). This program includes a licensee commitment to (1) participate in 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) submit an inspection plan for reactor internals to the NRC for review and approval upon completion of these programs, but not less than 24 months before entering the period of extended operation. This commitment is captured in the UFSAR Supplement description of the program (Appendix A.2.24).

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-81	Nickel alloy or nickel-alloy clad steam generator divider plate exposed to reactor coolant	Cracking due to primary water stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. VEGP manages PWSCC of the nickel alloy steam generator channel head divider plates with the Water Chemistry Control Program (Appendix B.3.28).
3.1.1-82	Stainless steel steam generator primary side divider plate exposed to reactor coolant	Cracking due to stress corrosion cracking	Water Chemistry	No	This item is not applicable to VEGP. The VEGP steam generator divider plates are fabricated from nickel alloys, not stainless steel. Therefore, the associated NUREG-1801 line item was not used.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-83	Stainless steel; steel with nickel-alloy or stainless steel cladding; and nickel-alloy reactor vessel internals and reactor coolant pressure boundary components exposed to reactor coolant	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. VEGP manages loss of material due to pitting and crevice corrosion with the Water Chemistry Control Program (Appendix B.3.28). For the Steam Generator Tubes, this line item is cited as a substitute match. Different from NUREG-1801 item IV.C2-15, the Steam Generator Tube Integrity Program (Appendix B.3.26) is credited in addition to the Water Chemistry Control Program to manage loss of material in steam generator tubes.
3.1.1-84	Nickel alloy steam generator components such as, secondary side nozzles (vent, drain, and instrumentation) exposed to secondary feedwater/ steam	Cracking due to stress corrosion cracking	Water Chemistry and One-Time Inspection or Inservice Inspection (IWB, IWC, and IWD).	No	This item is not applicable to VEGP. The VEGP steam generators are a recirculating design, not a once-through design. Therefore, the associated NUREG-1801 line item was not used.

Table 3.1.1 (Cont'd) Summary of Aging Management Evaluations for Reactor Vessel, Internals, and Reactor Coolant System in Chapter IV of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.1.1-85	Nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-86	Stainless steel piping, piping components, and piping elements exposed to air – indoor uncontrolled (External); air with borated water leakage; concrete; gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.1.1-87	Steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	This line item is not applicable to VEGP. VEGP has no in-scope reactor vessel, internals, and reactor coolant system components embedded in concrete.

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

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Bottom Head Torus and Dome	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
1b	Bottom Head Torus and Dome	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
2a	Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-1	3.1.1-23	E
2b	Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	C
2c	Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Bottom Mounted Instrumentation Penetrations	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Ni-Alloy Management Program for Non-RVCH Penetration Locations	IV.A2-19	3.1.1-31	E
3b	Bottom Mounted Instrumentation Penetrations	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
3c	Bottom Mounted Instrumentation Penetrations	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
4a	Closure Head Dome, Torus, and Flange	Pressure Boundary	Alloy Steel (with Stainless Steel Cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
4b	Closure Head Dome, Torus, and Flange	Pressure Boundary	Alloy Steel (with Stainless Steel Cladding)	Borated Water (Interior)	Loss of Material – Wear	Inservice Inspection Program	IV.A2-25	3.1.1-63	E

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4c	Closure Head Dome, Torus, and Flange	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
5	Closure Head Lifting Lugs and Vent Shroud Support Lugs	Structural Support	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
6a	Closure Studs, Nuts, and Washers	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking – SCC	Reactor Vessel Closure Head Stud Program	IV.A2-2	3.1.1-71	B
6b	Closure Studs, Nuts, and Washers	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
6c	Closure Studs, Nuts, and Washers	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Material – Wear	Reactor Vessel Closure Head Stud Program	IV.A2-3	3.1.1-71	B
7a	Conoseal Assemblies (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assemblies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-11	3.1.1-34	E

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7b	Conoseal Assemblies (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assemblies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
7c	Conoseal Assemblies (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assemblies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
8a	Conoseal (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assembly Fasteners	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Cracking-SCC	Bolting Integrity Program	IV.A2-6	3.1.1-52	E
8b	Conoseal (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assembly Fasteners	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Material – Wear	Bolting Integrity Program	IV.A2-7	3.1.1-52	E

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8c	Conoseal (Unit 1) and Core Exit Nozzle Thermocouple (Unit 2) Assembly Fasteners	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.A2-8	3.1.1-52	E
9a	Core Support Lugs & Pads	Structural Support	Nickel Alloy	Borated Water (Exterior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Reactor Vessel Internals Program	IV.A2-12	3.1.1-31	E
9b	Core Support Lugs & Pads	Structural Support	Nickel Alloy	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	C
10a	CRDM & Instrument. Housing Penetrations	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for RVCH Penetrations	IV.A2-9	3.1.1-65	E

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10b	CRDM & Instrument. Housing Penetrations	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
10c	CRDM & Instrument. Housing Penetrations	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
11a	CRDM Housing Adapters	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-11	3.1.1-34	E
11b	CRDM Housing Adapters	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
11c	CRDM Housing Adapters	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
12a	CRDM Latch Housings and Rod Travel Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-11	3.1.1-34	E

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12b	CRDM Latch Housings and Rod Travel Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
12c	CRDM Latch Housings and Rod Travel Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
13a	Head Vent Penetration	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for RVCH Penetrations	IV.A2-18	3.1.1-65	E
13b	Head Vent Penetration	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
13c	Head Vent Penetration	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
14a	Intermediate Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Fracture Toughness	Reactor Vessel Surveillance Program	IV.A2-24	3.1.1-18	B

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14b	Intermediate Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
14c	Intermediate Shell Course	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
15a	Leakage Monitoring Tube Assembly	Pressure Boundary	Nickel Alloy	Air – Indoor (Interior) (wetted)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for Non-RVCH Penetration Locations	None	None	F
15b	Leakage Monitoring Tube Assembly	Pressure Boundary	Nickel Alloy	Air – Indoor (Interior) (wetted)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	None	None	G
15c	Leakage Monitoring Tube Assembly	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16a	Lower Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Fracture Toughness	Reactor Vessel Surveillance Program	IV.A2-24	3.1.1-18	B
16b	Lower Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
16c	Lower Shell Course	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
17a	Primary Inlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Fracture Toughness	Reactor Vessel Surveillance Program	IV.A2-17	3.1.1-18	B
17b	Primary Inlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
17c	Primary Inlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Primary Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for Non-RVCH Penetration Locations	IV.A2-15	3.1.1-69	E
18b	Primary Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
18c	Primary Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
19a	Primary Nozzle Safe Ends	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-15	3.1.1-69	E
19b	Primary Nozzle Safe Ends	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
19c	Primary Nozzle Safe Ends	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20a	Primary Outlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
20b	Primary Outlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
21	Refueling Seal Ledge	Pressure Boundary Structural Support	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
22a	Seal Table and Fittings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.A2-1	3.1.1-23	E
22b	Seal Table and Fittings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	C
22c	Seal Table and Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
23a	Upper (nozzle) Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Fracture Toughness	Reactor Vessel Surveillance Program	IV.A2-24	3.1.1-18	B
23b	Upper (nozzle) Shell Course	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
23c	Upper (nozzle) Shell Course	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
24	Ventilation Shroud Support Ring	Structural Support	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A
25a	Vessel Flange	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	A
25b	Vessel Flange	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material – Wear	Inservice Inspection Program	IV.A2-25	3.1.1-63	E
25c	Vessel Flange	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Los of Material – BAC	Boric Acid Corrosion Control Program	IV.A2-13	3.1.1-58	A

Table 3.1.2-1 (Cont'd) Reactor Vessel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
26a	Vessel Head Thermal Sleeves	Structural Support	Stainless Steel	Borated Water (Int / Ext)	Cracking – SCC	Water Chemistry Control Program	IV.A2-11	3.1.1-34	E 101
26b	Vessel Head Thermal Sleeves	Structural Support	Stainless Steel	Borated Water (Int / Ext)	Loss of Material	Water Chemistry Control Program	IV.A2-14	3.1.1-83	C 101
26c	Vessel Head Thermal Sleeves	Structural Support	Stainless Steel	Borated Water (Int / Ext)	Loss of Material - Wear	Reactor Vessel Internals Program	None	None	H 101

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

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Baffle and Former Plates	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-1	3.1.1-33	A
1b	Baffle and Former Plates	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-2	3.1.1-30	A
1c	Baffle and Former Plates	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-3	3.1.1-22	A
1d	Baffle and Former Plates	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
2a	Baffle Bolts	RVI-1 RVI-3	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-4	3.1.1-33	A
2b	Baffle Bolts	RVI-1 RVI-3	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-10	3.1.1-30	A
2c	Baffle Bolts	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-6	3.1.1-22	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2d	Baffle Bolts	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
2e	Baffle Bolts	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-5	3.1.1-27	A
3a	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-11	3.1.1-33	A
3b	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-12	3.1.1-30	A
3c	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3d	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
3e	Bottom Mounted Instrumentation Column Assemblies (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-25	3.1.1-27	C
4a	Bottom Mounted Instrumentation Column Cruciforms	RVI-4	Cast Austenitic Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-24	3.1.1-30	C
4b	Bottom Mounted Instrumentation Column Cruciforms	RVI-4	Cast Austenitic Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-21	3.1.1-80	E
4c	Bottom Mounted Instrumentation Column Cruciforms	RVI-4	Cast Austenitic Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5a	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-15 IV.B2-19	3.1.1-33	A
5b	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-16 IV.B2-20	3.1.1-37	A
5c	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-17	3.1.1-22	A
5d	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
5e	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	None	3.1.1-63	H 102
5f	Clevis Inserts and Fasteners	RVI-1	Nickel Alloy	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-14	3.1.1-27	A
6a	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-27 IV.B2-29	3.1.1-33	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6b	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-28 IV.B2-30	3.1.1-37 3.1.1-30	A
6c	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
6d	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
6e	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-26	3.1.1-63	E
6f	Control Rod Guide Tube Assemblies (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C

Table 3.1.2-2 (Cont'd)   Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-27	3.1.1-33	A
7b	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-28	3.1.1-37	A
7c	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
7d	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
7e	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-26	3.1.1-63	E
7f	Control Rod Guide Tube Support Pins	RVI-2	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C
8a	Core Barrel, Core Barrel Flange, and Core Barrel Outlet Nozzles	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-7	3.1.1-33	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8b	Core Barrel, Core Barrel Flange, and Core Barrel Outlet Nozzles	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-8	3.1.1-30	A
8c	Core Barrel, Core Barrel Flange, and Core Barrel Outlet Nozzles	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-9	3.1.1-22	A
8d	Core Barrel, Core Barrel Flange, and Core Barrel Outlet Nozzles	RVI-1 RVI-3 RVI-6	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
9a	Flux Thimble Tubes	RVI-4	Stainless Steel	Borated Water (Exterior)	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-12	3.1.1-30	C
9b	Flux Thimble Tubes	RVI-4	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
9c	Flux Thimble Tubes	RVI-4	Stainless Steel	Borated Water (Exterior)	Loss of Material – Wear	Flux Thimble Tube Inspection Program	IV.B2-13	3.1.1-60	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9d	Flux Thimble Tubes	RVI-4	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
10a	Head / RPV Alignment Pins (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-40	3.1.1-37	C
10b	Head / RPV Alignment Pins (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
10c	Head / RPV Alignment Pins (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-34	3.1.1-63	E
10d	Head / RPV Alignment Pins (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C
11a	Head Cooling Spray Nozzles	RVI-3	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-40	3.1.1-37	C

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11b	Head Cooling Spray Nozzles	RVI-3	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
12a	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-41	3.1.1-33	A
12b	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-42	3.1.1-30	A
12c	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
12d	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
12e	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-34	3.1.1-63	E
12f	Hold-down Spring	RVI-1	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-33	3.1.1-27	A
13a	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-15 IV.B2-19	3.1.1-33	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13b	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-16 IV.B2-20	3.1.1-37	A
13c	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-17 IV.B2-18	3.1.1-22	A
13d	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
13e	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-34	3.1.1-63	E
13f	Lower Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-25	3.1.1-27	C

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14a	Lower Support Column Assemblies (with associated fasteners)	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-15 IV.B2-23	3.1.1-33	A
14b	Lower Support Column Assemblies (with associated fasteners)	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-16 IV.B2-24	3.1.1-37 3.1.1-30	A
14c	Lower Support Column Assemblies (with associated fasteners)	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-17 IV.B2-22	3.1.1-22	A
14d	Lower Support Column Assemblies (with associated fasteners)	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
14e	Lower Support Column Assemblies (with associated fasteners)	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-25	3.1.1-27	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15a	Lower Support Forging	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-23	3.1.1-33	A
15b	Lower Support Forging	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-24	3.1.1-30	A
15c	Lower Support Forging	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	A
15d	Lower Support Forging	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
16a	Neutron Shields (with associated fasteners)	RVI-6	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-8	3.1.1-30	C
16b	Neutron Shields (with associated fasteners)	RVI-6	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-9	3.1.1-22	C

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16c	Neutron Shields (with associated fasteners)	RVI-6	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
16d	Neutron Shields (with associated fasteners)	RVI-6	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-5	3.1.1-27	C
17a	Radial Support Keys	RVI-1	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-19	3.1.1-33	A
17b	Radial Support Keys	RVI-1	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-20	3.1.1-37	A
17c	Radial Support Keys	RVI-1	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
17d	Radial Support Keys	RVI-1	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
17e	Radial Support Keys	RVI-1	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-26	3.1.1-63	E

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Secondary Core Support Assembly (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-24	3.1.1-30	C
18b	Secondary Core Support Assembly (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
18c	Secondary Core Support Assembly (with associated fasteners)	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-25	3.1.1-27	C
19a	Upper Core Plate Alignment Pins	RVI-2	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-39	3.1.1-33	A
19b	Upper Core Plate Alignment Pins	RVI-2	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-40	3.1.1-37	A
19c	Upper Core Plate Alignment Pins	RVI-2	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
19d	Upper Core Plate Alignment Pins	RVI-2	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A
19e	Upper Core Plate Alignment Pins	RVI-2	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-34	3.1.1-63	E
20a	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-39 IV.B2-41	3.1.1-33	A
20b	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-40 IV.B2-42	3.1.1-37 3.1.1-30	A
20c	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
20d	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20e	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Material – Wear	Reactor Vessel Internals Program	IV.B2-34	3.1.1-63	E
20f	Upper Core Plate and Fuel Alignment Pins (with associated fasteners)	RVI-1 RVI-3	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C
21a	Upper Instrument. Conduit and Supports (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-30	3.1.1-30	C
21b	Upper Instrument. Conduit and Supports (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
21c	Upper Instrument. Conduit and Supports (with associated fasteners)	RVI-4	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C
22a	Upper Support Assembly (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-41	3.1.1-33	A
22b	Upper Support Assembly (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-42	3.1.1-30	A
22c	Upper Support Assembly (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
22d	Upper Support Assembly (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
22e	Upper Support Assembly (with associated fasteners)	RVI-2	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	C
23a	Upper Support Column Assemblies (with associated fasteners)	RVI-2 RVI-4	Stainless Steel	Borated Water	Change in Dimension	Reactor Vessel Internals Program	IV.B2-35 IV.B2-39	3.1.1-33	A
23b	Upper Support Column Assemblies (with associated fasteners)	RVI-2 RVI-4	Stainless Steel	Borated Water	Cracking – SCC	Reactor Vessel Internals Program Water Chemistry Control Program	IV.B2-36 IV.B2-40	3.1.1-30 3.1.1-37	A
23c	Upper Support Column Assemblies (with associated fasteners)	RVI-2 RVI-4	Stainless Steel	Borated Water	Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2-22	3.1.1-22	C
23d	Upper Support Column Assemblies (with associated fasteners)	RVI-2 RVI-4	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	IV.B2-32	3.1.1-83	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

ID	Component Type	Intended Function (1)	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
23e	Upper Support Column Assemblies (with associated fasteners)	RVI-2 RVI-4	Stainless Steel	Borated Water	Loss of Preload	Reactor Vessel Internals Program	IV.B2-38	3.1.1-27	A

Table 3.1.2-2 (Cont'd) Reactor Vessel Internals: Summary of Aging Management Review

(1) Reactor Vessel Internals Intended Functions:

RVI-1 – Structural Support (Provide support and orientation of the reactor core.)

RVI-2 – Structural Support (Provide support, orientation, guidance, and protection of the control rod assemblies.)

RVI-3 – Flow Distribution (Provide a passageway for the distribution of reactor coolant flow to the reactor core.)

RVI-4 – Structural Support (Provide a passageway for support, guidance, and protection for incore instrumentation.)

RVI-5 – Structural Support (Provide a secondary core support for limiting the core support structure downward displacement.)

RVI-6 – Radiation Shielding (Provide gamma and neutron shielding for the reactor vessel.)

Table 3.1.2-3 Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Capillary Tubing (sealed) for RVLIS Lvl. Transmitters	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
1b	Capillary Tubing (sealed) for RVLIS Lvl. Transmitters	Pressure Boundary	Stainless Steel	Silicone Fluid (Interior)	None	None Required	None	None	G
2a	Closure Bolting	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
2b	Closure Bolting	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E
2c	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E
3a	Closure Bolting, Class 1	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking - SCC	Bolting Integrity Program	IV.C2-7	3.1.1-52	E
3b	Closure Bolting, Class 1	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
3c	Closure Bolting, Class 1	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3d	Closure Bolting, Class 1	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Cracking - SCC	Bolting Integrity Program	IV.C2-7	3.1.1-52	E
3e	Closure Bolting, Class 1	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E
4a	Flow Orifice/Elements	Pressure Boundary Flow Restriction	Stainless Steel	Borated Water (Interior)	Loss of material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
4b	Flow Orifice/Elements	Pressure Boundary Flow Restriction	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-27	3.1.1-68	E
4c	Flow Orifice/Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
5a	Oil Coolers – RCP Motors (Channel Heads)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking – SCC	ACCW System Carbon Steel Components Program	None	None	H

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Oil Coolers – RCP Motors (Channel Heads)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	IV.C2-14	3.1.1-53	D
5c	Oil Coolers – RCP Motors (Channel Heads)	Pressure Boundary	Carbon Steel	Air - Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
5d	Oil Coolers – RCP Motors (Channel Heads)	Pressure Boundary	Carbon Steel	Air - Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
6a	Oil Coolers – RCP Motors (Shells)	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-5	3.3.1-21	B
6b	Oil Coolers – RCP Motors (Shells)	Pressure Boundary	Carbon Steel	Air - Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
6c	Oil Coolers – RCP Motors (Shells)	Pressure Boundary	Carbon Steel	Air - Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-27	3.1.1-68	E
7b	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
7c	Piping Components	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
7d	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
7e	Piping Components	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
7f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
7g	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7h	Piping Components	Pressure Boundary	Carbon Steel	Dirty – Drainage (Interior)	Loss of Material	One–Time Inspection Program	VII.G-26	3.3.1-15	E
7i	Piping Components	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One–Time Inspection Program	VII.H2-20	3.3.1-14	B
8a	Piping Components – Class 1 < NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - Cyclic Loading	One-Time Inspection for ASME Class 1 Small Bore Piping Fatigue Monitoring Program Inservice Inspection Program	IV.C2-1	3.1.1-70	E
8b	Piping Components – Class 1 < NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program One-Time Inspection for ASME Class 1 Small Bore Piping Inservice Inspection Program	IV.C2-1	3.1.1-70	E

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8c	Piping Components – Class 1 < NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
8d	Piping Components – Class 1 < NPS 4	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
9a	Piping Components – Class 1 ≥ NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - Cyclic Loading	Fatigue Monitoring Program Inservice Inspection Program	IV.C2-26	3.1.1-62	E 105
9b	Piping Components – Class 1 ≥ NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-27	3.1.1-68	E
9c	Piping Components – Class 1 ≥ NPS 4	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
9d	Piping Components – Class 1 ≥ NPS 4	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10a	Piping Components - Reactor Coolant Loop	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-3	3.1.1-24	E 103
10b	Piping Components - Reactor Coolant Loop	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A 103
10c	Piping Components - Reactor Coolant Loop	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior) (T>482 F)	Loss of Fracture Toughness	CASS RCS Fitting Evaluation Program	IV.C2-4	3.1.1-57	B 103 104
10d	Piping Components - Reactor Coolant Loop	Pressure Boundary	Cast Austenitic Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A 103
11a	Pressurizer Relief Tank	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-22	3.1.1-68	E
11b	Pressurizer Relief Tank	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11c	Pressurizer Relief Tank	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	C
12	RCP Bolting Ring	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
13a	RCP Casing	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-5	3.1.1-68	E
13b	RCP Casing	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior)	Loss of Fracture Toughness	Inservice Inspection Program	IV.C2-6	3.1.1-55	E
13c	RCP Casing	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
13d	RCP Casing	Pressure Boundary	Cast Austenitic Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
14a	RCP Closure Bolting	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking - SCC	Bolting Integrity Program	IV.C2-7	3.1.1-52	E
14b	RCP Closure Bolting	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14c	RCP Closure Bolting	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E
15a	RCP Lube Oil Drain Tank	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
15b	RCP Lube Oil Drain Tank	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
15c	RCP Lube Oil Drain Tank	Pressure Boundary	Carbon Steel	Dirty – Drainage (Interior)	Loss of Material	One–Time Inspection Program	VII.G-27	3.3.1-16	E
16a	RCP Lube Oil Drain Tank Flame Arrestor Element	Flame Arresting	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
17a	RCP Lube Oil Drain Tank Flame Arrestor Housing	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
17b	RCP Lube Oil Drain Tank Flame Arrestor Housing	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
17c	RCP Lube Oil Drain Tank Flame Arrestor Housing	Pressure Boundary	Carbon Steel	Air – Indoor (Int)	Loss of Material	One–Time Inspection Program	V.A-19	3.2.1-32	E
18a	RCP Lube Oil Drip Pans and Enclosure	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
18b	RCP Lube Oil Drip Pans and Enclosure	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
18c	RCP Lube Oil Drip Pans and Enclosure	Pressure Boundary	Carbon Steel	Dirty – Drainage (Interior)	Loss of Material	One–Time Inspection Program	VII.G-26	3.3.1-15	E
19a	RCP Thermal Barrier Assembly	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Interior)	Cracking - SCC	Closed Cooling Water Program	V.A-24	3.2.1-25	D
19b	RCP Thermal Barrier Assembly	Pressure Boundary	Stainless Steel	Closed Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	V.A-7	3.2.1-28	B
19c	RCP Thermal Barrier Assembly	Pressure Boundary	Stainless Steel	Borated Water (Ext)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-2	3.1.1-68	E

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
19d	RCP Thermal Barrier Assembly	Pressure Boundary	Stainless Steel	Borated Water (Ext)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
20a	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-27	3.1.1-68	E
20b	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
20c	Valve Bodies	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
20d	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
20e	Valve Bodies	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
20f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
20g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.1.1-58	B

Table 3.1.2-3 (Cont'd) Reactor Coolant System and Connected Lines: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20h	Valve Bodies	Pressure Boundary	Carbon Steel	Dirty – Drainage (Interior)	Loss of Material	One–Time Inspection Program	VII.G-26	3.3.1-15	E
20i	Valve Bodies	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One–Time Inspection Program	VII.H2-20	3.3.1-14	B
21a	Valve Bodies – Class 1	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking - SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-27	3.1.1-68	E
21b	Valve Bodies – Class 1	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water (Interior) (T>482 F)	Loss of Fracture Toughness	Inservice Inspection Program	IV.C2-6	3.1.1-55	E
21c	Valve Bodies – Class 1	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
21d	Valve Bodies – Class 1	Pressure Boundary	Stainless Steel	Air - Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-4 Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting (Manway)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking – SCC	Bolting Integrity Program	IV.C2-7	3.1.1-52	E
1b	Closure Bolting (Manway)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
1c	Closure Bolting (Manway)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.C2-8	3.1.1-52	E
2a	Heater Sheaths	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Inservice Inspection Program Water Chemistry Control Program	IV.C2-20	3.1.1-68	E
2b	Heater Sheaths	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
2c	Heater Sheaths	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
2d	Heater Sheaths	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Heater Well Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-20	3.1.1-68	E
3b	Heater Well Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
3c	Heater Well Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
3d	Heater Well Penetrations	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
4a	Instrument Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-19	3.1.1-64	E
4b	Instrument Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
4c	Instrument Penetrations	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4d	Instrument Penetrations	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
5a	Manway and Cover	Pressure Boundary	Alloy Steel (Stainless Steel Cover)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
5b	Manway and Cover	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
6a	Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for Non-RVCH Penetration Locations	IV.C2-24	3.1.1-31	E
6b	Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
6d	Nozzle Dissimilar Metal Welds	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
7a	Nozzles – Safe Ends	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.C2-19	3.1.1-64	E
7b	Nozzles – Safe Ends	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
7c	Nozzles – Safe Ends	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
7d	Nozzles – Safe Ends	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
8a	Nozzles - Safety & Relief Nozzles	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
8b	Nozzles - Safety & Relief Nozzles	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Nozzles - Spray Nozzles	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
9b	Nozzles - Spray Nozzles	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
9c	Nozzles - Spray Nozzles	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
10a	Nozzles - Surge Nozzles	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
10b	Nozzles - Surge Nozzles	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
10c	Nozzles - Surge Nozzles	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11a	Shells, Upper Head, and Lower Head	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Cracking – Cyclic Loading	Inservice Inspection Program Fatigue Monitoring Program	IV.C2-18	3.1.1-67	E
11b	Shells, Upper Head, and Lower Head	Pressure Boundary	Alloy Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A
11c	Shells, Upper Head, and Lower Head	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
12	Support Lugs (Seismic Lugs)	Structural Support	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
13	Support Skirt and Flange	Structural Support	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	IV.C2-9	3.1.1-58	A
14a	Thermal Sleeves (Surge and Spray Nozzles)	Structural Support	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program	None	None	J

Table 3.1.2-4 (Cont'd) Pressurizer: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14b	Thermal Sleeves (Surge and Spray Nozzles)	Structural Support	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	A

Table 3.1.2-5 Steam Generators: Summary of Aging Management Evaluation

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Anti-Vibration Bars	Structural Support	Nickel Alloy (Chrome Plated)	Treated Water/ Steam	Cracking - SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-14	3.1.1-74	B
1b	Anti-Vibration Bars	Structural Support	Nickel Alloy (Chrome Plated)	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	None	None	H
1c	Anti-Vibration Bars	Structural Support	Nickel Alloy (Chrome Plated)	Treated Water/ Steam	Loss of Material – Wear	Steam Generator Tubing Integrity Program	IV.D1-15	3.1.1-74	E
2a	Auxiliary Feedwater Nozzle	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Cracking - Cyclic Loading	Fatigue Monitoring Program Inservice Inspection Program	None	None	H
2b	Auxiliary Feedwater Nozzle	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2c	Auxiliary Feedwater Nozzle	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (T ≥ 212 ºF)	None	None Required	None	None	G 106
3a	Auxiliary Feedwater Nozzle Thermal Sleeve	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Cracking - SCC	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-14	3.1.1-74	E
3b	Auxiliary Feedwater Nozzle Thermal Sleeve	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program	None	None	H
4	Auxiliary Feedwater Spray Piping	Flow Distribution Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-9	3.1.1-76	E
5a	Closure Bolting (Primary)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking – SCC	Bolting Integrity Program	IV.D1-2	3.1.1-52	E
5b	Closure Bolting (Primary)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.D1-3	3.1.1-58	A

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5c	Closure Bolting (Primary)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.D1-10	3.1.1-52	E
6a	Closure Bolting (Secondary)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Cracking – Cyclic Loading	Bolting Integrity Program	IV.D1-11	3.1.1-7	E 107
6b	Closure Bolting (Secondary)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	IV.D1-10	3.1.1-52	E
7a	Feedwater Distribution Assembly Piping, Fittings, & Supports	Flow Distribution Physical Integrity	Carbon Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-9	3.1.1-76	E
7b	Feedwater Distribution Assembly Piping, Fittings, & Supports	Flow Distribution Physical Integrity	Carbon Steel	Treated Water/ Steam	Loss of Material – FAC	Steam Generator Program for Upper Internals	IV.D1-26	3.1.1-32	E
8a	Feedwater Inlet Nozzle	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Cracking – Cyclic Loading	Fatigue Monitoring Program Inservice Inspection Program	None	None	H

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8b	Feedwater Inlet Nozzle	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
8c	Feedwater Inlet Nozzle	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material – FAC	Flow-Accelerated Corrosion Program	IV.D1-5	3.1.1-59	B
8d	Feedwater Inlet Nozzle	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (T $\geq$ 212 °F)	None	None Required	None	None	G 106
9a	Feedwater Inlet Nozzle Thermal Sleeve	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Cracking – SCC	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-14	3.1.1-74	E
9b	Feedwater Inlet Nozzle Thermal Sleeve	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	None	None	H

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10a	Feedwater J-Tubes	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Cracking – SCC	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-14	3.1.1-74	E
10b	Feedwater J-Tubes	Flow Distribution Structural Support	Nickel Alloy	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	None	None	H
11a	Moisture Separator Assembly - Primary	Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-9	3.1.1-76	E
11b	Moisture Separator Assembly - Primary	Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material – FAC	Steam Generator Program for Upper Internals	IV.D1-26	3.1.1-32	E

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12a	Moisture Separator Assembly - Secondary	Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Program for Upper Internals	IV.D1-9	3.1.1-76	E
12b	Moisture Separator Assembly - Secondary	Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material – FAC	Steam Generator Program for Upper Internals	IV.D1-26	3.1.1-32	E
13a	Primary Channel Head (with Integral Primary Nozzles & Manways)	Pressure Boundary	Carbon Steel (with Stainless Steel cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
13b	Primary Channel Head (with Integral Primary Nozzles & Manways)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.D1-3	3.1.1-58	A
14a	Primary Channel Head Divider Plate	Pressure Boundary	Nickel Alloy	Borated Water	Cracking – SCC	Water Chemistry Control Program	IV.D1-6	3.1.1-81	A
14b	Primary Channel Head Divider Plate	Pressure Boundary	Nickel Alloy	Borated Water	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15a	Primary Channel Head Drain Connection Coupling	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.D1-1	3.1.1-68	E
15b	Primary Channel Head Drain Connection Coupling	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
15c	Primary Channel Head Drain Connection Coupling	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A
16a	Primary Channel Head Drain Connection Tube & Dissimilar Metal Weld	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program Nickel Alloy Management Program for Non-RVCH Penetration Locations	IV.D1-4	3.1.1-31	E

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16b	Primary Channel Head Drain Connection Tube & Dissimilar Metal Weld	Pressure Boundary	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
16c	Primary Channel Head Drain Connection Tube & Dissimilar Metal Weld	Pressure Boundary	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
17a	Primary Inlet and Outlet Nozzle Safe Ends (stainless steel weld buildup)	Pressure Boundary	Stainless Steel (weld metal buildup)	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Inservice Inspection Program	IV.D1-1	3.1.1-68	E
17b	Primary Inlet and Outlet Nozzle Safe Ends (stainless steel weld buildup)	Pressure Boundary	Stainless Steel (weld metal buildup)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
17c	Primary Inlet and Outlet Nozzle Safe Ends (stainless steel weld buildup)	Pressure Boundary	Stainless Steel (weld metal buildup)	Air – Indoor (Exterior)	None	None Required	IV.E-2	3.1.1-86	A

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18	Primary Inlet and Outlet Nozzle Weld Cap (Inconel Weld Overlay)	Structural Support	Nickel Alloy	Air – Indoor (Exterior)	None	None Required	IV.E-1	3.1.1-85	A
19a	Primary Manway Covers and Disc Inserts	Pressure Boundary	Carbon Steel (with Stainless Steel Insert)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
19b	Primary Manway Covers and Disc Inserts	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.D1-3	3.1.1-58	A
20a	Secondary Side Manways, Handholes, and Covers	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
20b	Secondary Side Manways, Handholes, and Covers	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) ($T \geq 212$ ºF)	None	None Required	None	None	G 106

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
21a	Secondary Side Shell Penetrations (Blowdown, Drain, Water Level, Sampling, Layup)	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
21b	Secondary Side Shell Penetrations (Blowdown, Drain, Water Level, Sampling, Layup)	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.D1-3	3.1.1-58	A
22	Stayrod Assemblies	Structural Support	Carbon Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-9	3.1.1-76	D
23a	Steam Outlet Flow Limiter	Flow Restriction	Nickel Alloy	Steam	Cracking – SCC	Water Chemistry Control Program	IV.D1-14	3.1.1-74	E
23b	Steam Outlet Flow Limiter	Flow Restriction	Nickel Alloy	Steam	Loss of Material	Water Chemistry Control Program	VIII.B1-1	3.4.1-37	A

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
24a	Steam Outlet Nozzle	Pressure Boundary	Alloy Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
24b	Steam Outlet Nozzle	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) ($T \geq 212$ ºF)	None	None Required	None	None	G 106
25a	Trunions - Upper and Lower	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
25b	Trunions - Upper and Lower	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) ($T \geq 212$ ºF)	None	None Required	None	None	G 106
26	Tube Bundle Wrapper and Support Assembly	Flow Direction Structural Support	Carbon Steel	Treated Water/ Steam (Exterior)	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-9	3.1.1-76	B

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
27a	Tube Plugs	Pressure Boundary	Nickel Alloy	Borated Water (Exterior)	Cracking – SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-18	3.1.1-73	B
27b	Tube Plugs	Pressure Boundary	Nickel Alloy	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
27c	Tube Plugs	Pressure Boundary	Nickel Alloy	Treated Water/ Steam (Exterior)	Cracking – SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-22 IV.D1-23	3.1.1-72	C
27d	Tube Plugs	Pressure Boundary	Nickel Alloy	Treated Water/ Steam (Exterior)	Loss of Material	Water Chemistry Control Program	None	None	H
28a	Tube Support Plates, Flow Distribution Baffles	Flow Distribution Structural Support	Stainless Steel	Treated Water/ Steam	Cracking – SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-15	3.1.1-74	D

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
28b	Tube Support Plates, Flow Distribution Baffles	Flow Distribution Structural Support	Stainless Steel	Treated Water/ Steam	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	None	None	H
29a	Tubeplate	Pressure Boundary	Alloy Steel (Nickel Alloy Clad)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
29b	Tubeplate	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Exterior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program Steam Generator Tubing Integrity Program	IV.D1-12	3.1.1-16	E
29c	Tubeplate	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	IV.D1-3	3.1.1-58	A

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
30a	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Borated Water (Interior)	Cracking – SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-20	3.1.1-73	B
30b	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.C2-15	3.1.1-83	E
30c	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Treated Water/ Steam (Exterior)	Cracking – SCC	Water Chemistry Control Program Steam Generator Tubing Integrity Program	IV.D1-22 IV.D1-23	3.1.1-72	B
30d	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Treated Water/ Steam (Exterior)	Loss of Material	Water Chemistry Control Program Steam Generator Tubing Integrity Program	None	None	H

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
30e	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Treated Water/ Steam (Exterior)	Loss of Material – Wear	Steam Generator Tubing Integrity Program	IV.D1-24	3.1.1-72	E
30f	Tubes (U-Tubes)	Pressure Boundary Exchange Heat	Nickel Alloy	Treated Water/ Steam (Exterior)	Reduction in Heat Transfer	Water Chemistry Control Program Steam Generator Tubing Integrity Program	None	None	H
31a	Upper Head	Pressure Boundary	Alloy Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E
31b	Upper Head	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (T $\geq$ 212 ºF)	None	None Required	None	None	G 106
32a	Upper Shells, Lower Shells, and Transition Cones	Pressure Boundary	Alloy Steel	Treated Water/ Steam (Interior)	Loss of Material	Water Chemistry Control Program Inservice Inspection Program	IV.D1-12	3.1.1-16	E

Table 3.1.2-5 (Cont'd) Steam Generators: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
32b	Upper Shells, Lower Shells, and Transition Cones	Pressure Boundary	Alloy Steel	Air – Indoor (Exterior) (T $\geq$ 212 ºF)	None	None Required	None	None	G 106

Standard Notes for Reactor Vessel, Internals, Reactor Coolant System, and Steam Generator

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.

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

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

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

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

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

Plant Specific Notes for Reactor Vessel, Internals, Reactor Coolant System, and Steam Generator

101. The VEGP Reactor Vessel Heads incorporate thermal sleeves for the CRDM penetrations. The primary use of these thermal sleeves is to accommodate normal random misalignments of the drive rod. The thermal sleeve provides the centering guidance for leading the drive rod into the CRDM. Wear of these thermal sleeves has been identified as an aging effect requiring management based on recent plant specific operating experience.

102. NUREG-1801 does not address wear of nickel alloy material in item IV.B2-26. However, this line item rolls into Table 3.1.1 item 63 which does address nickel alloy material.

103. The VEGP cast austenitic stainless steel piping line item is defined to include the cast safety injection accumulator branch outlets.

104. Based on the screening criteria endorsed by NUREG-1801 Vol. 2, Rev. 1, only the Unit 1, Loop 4 crossover leg RCP inlet elbow and the Unit 2, Loop 1 crossover leg RCP inlet elbow are susceptible to loss of fracture toughness due to thermal embrittlement.

105. The associated NUREG-1801 Vol. 2 item does not include all of the piping lines applicable for VEGP. Stress based fatigue monitoring to manage thermal fatigue is performed by the Fatigue Monitoring Program for a number of VEGP ASME Class 1 piping locations. See Section 4.3.1.

106. Revision 1 of NUREG-1801 Vol. 2 does not include an external surfaces environment with operating temperatures exceeding 212 °F. External surfaces operating at temperatures above this threshold drive off moisture and preclude corrosion of the component external surfaces. Additionally, borated water leakage is not a concern for this location.

107. Replacement of steam generator secondary side manway bolts is planned to manage cracking due to fatigue. This approach ensures the number of transient cycles experienced by the bolting remain conservative with respect to the fatigue analyses. See Section 3.1.2.2.1 and Section 4.3.5 for additional discussion.

3.2 AGING MANAGEMENT OF ENGINEERED SAFETY FEATURES SYSTEMS

3.2.1 INTRODUCTION

This section provides the results of the aging management review of the engineered safety features system component groups identified in Tables 2.3.2.1 through 2.3.2.2. The following systems are addressed in this system group (with the applicable Section 2 reference in parentheses):

- Containment Spray System (Section 2.3.2.1)
- Emergency Core Cooling System (Section 2.3.2.2)

Table 3.2.1, Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801, provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for the engineered safety features systems component groups that are relied on for license renewal. Text addressing summary items requiring further evaluation is provided in Section 3.2.2.2.

The format and usage of this Table and the associated further evaluation text is described in Section 3.0.2.

3.2.2 RESULTS

The following tables summarize the results of the aging management reviews for systems in the engineered safety features systems group:

Table 3.2.2-1 Containment Spray System – Summary of Aging Management Review

Table 3.2.2-2 Emergency Core Cooling System – Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the engineered safety feature systems in the following Sections:

- Containment Spray System (Section 3.2.2.1.1)
- Emergency Core Cooling System (Section 3.2.2.1.2)

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

3.2.2.1.1 *Containment Spray System Aging Management Review Results*

Materials

The materials of construction for the Containment Spray System components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Stainless Steel

Environments

Components of the Containment Spray System are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Borated Water
- Concrete
- Raw Water – Nuclear Service Cooling Water
- Silicone Fluid

Aging Effects Requiring Management

The following aging effects associated with the Containment Spray System components and commodities require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Spray System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.2.2.1.2 *Emergency Core Cooling System Aging Management Review Results*

Materials

The materials of construction for the Emergency Core Cooling System (ECCS) components requiring aging management review are:

- Carbon Steel
- Carbon Steel / Stainless Steel Clad
- Cast Iron
- Copper Alloys
- Glass
- Stainless Steel

Environments

Components of the ECCS are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Air - Ventilation
- Borated Water
- Closed-Cycle Cooling Water
- Concrete
- Gas - Dried
- Lube Oil
- Raw Water - Nuclear Service Cooling Water

Aging Effects Requiring Management

The following aging effects associated with the ECCS components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Leaching
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the ECCS components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.2.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Engineered Safety Features

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.2.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.2.2.2.1 *Cumulative Fatigue Damage*

Fatigue is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of the fatigue TLAA is addressed in Section 4.3 of this application.

3.2.2.2.2 *Loss of Material due to Cladding Breach*

Loss of Material due to cladding breach could occur for PWR pump casings with stainless steel cladding subjected to borated water. NRC Information Notice 94-63 alerted licensees to the potential for corrosion beneath the stainless steel cladding due to cracks in the cladding. Information 94-63 includes the following description of the circumstances:

> *"During July and August 1993 Virginia Electric Power Company discovered severe corrosion damage of the carbon steel casing of a high head safety injection pump at North Anna Unit 1. The damage was caused by cracks through the stainless steel cladding in the pump that allowed corrosive attack by the boric acid coolant. The cracks were discovered when the pump was disassembled for maintenance and rust was observed on the otherwise shiny surface of the cladding in the discharge section of the pump."*

The VEGP Centrifugal Charging Pumps, Safety Injection Pumps, and Residual Heat Removal Pumps use solid stainless steel casings. Therefore, loss of material due to cladding breach is not applicable for VEGP.

3.2.2.2.3 *Loss of Material due to Pitting and Crevice Corrosion*

(1) Internal surfaces of stainless steel containment isolation piping components

NUREG-1800 item 3.2.2.2.3 (1) indicates that loss of material due to general, pitting and crevice corrosion on the internal surfaces of stainless steel containment isolation piping components exposed to treated water.

While the VEGP AMR methodology predicts loss of material as an aging effect requiring management for stainless steel components exposed to a treated water environment, the VEGP AMR results for ESF systems do not use this line item. Containment isolation piping components are evaluated with their parent system.

(2) Stainless steel components exposed to soil

NUREG-1800 item 3.2.2.2.3 (2) discusses loss of material due to pitting and crevice corrosion for stainless steel components exposed to soil, raw water, or internal condensation. However, the only NUREG-1801 items aligned with this further discussion item relate to the soil environment. The raw water and internal condensation environments are not represented. Therefore, the VEGP discussion only addresses the soil environment.

This item is not applicable to VEGP. While the VEGP AMR methodology does predict loss of material for stainless steel piping components exposed to a soil environment, the VEGP ESF Systems AMR results do not include any stainless steel piping components exposed to a soil environment.

(3) BWR stainless steel and aluminum piping components exposed to treated water

NUREG-1800 Item 3.2.2.2.3 (3) relates to loss of material due to pitting and crevice corrosion in stainless steel or aluminum piping components. All of the NUREG-1801 items aligning to this further discussion section are associated with BWR systems.

This item is applicable only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(4) Stainless steel and copper alloy components exposed to lube oil

NUREG-1800 item 3.2.2.2.3 (4) relates to loss of material due to pitting and crevice corrosion for stainless steel and copper alloy components exposed to lubricating oil. A one-time inspection is recommended to verify the effectiveness of lubricating oil controls in managing loss of material.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage loss of material in piping components exposed to lubricating oil with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17).

(5) Partially encased stainless steel tanks exposed to raw water

NUREG-1800 item 3.2.2.2.3 (5) discusses loss of material due to pitting and crevice corrosion for partially encased stainless steel tanks exposed to raw water due to cracking of the perimeter seal by weathering.

This item is not applicable to VEGP. The VEGP Refueling Water Storage Tank uses a stainless steel liner encased in concrete and does not have a moisture barrier configuration exposed to raw water.

(6) Stainless steel piping, components, and tanks exposed to internal condensation

NUREG-1800 item 3.2.2.2.3 (6) relates to loss of material due to crevice corrosion and pitting for stainless steel components exposed to internal condensation. A plant-specific program is recommended.

The VEGP ESF systems do not include any stainless steel piping components or tanks exposed to internal condensation.

3.2.2.2.4 *Reduction of Heat Transfer due to Fouling*

(1) Fouling of heat exchanger tubes exposed to lube oil

NUREG-1800 item 3.2.2.2.4.1 relates to reduction of heat transfer due to fouling could occur for steel, stainless steel, and copper alloy heat transfer tubes exposed to lubricating oil. The aging management recommended is lube oil chemistry control and a confirmatory one-time inspection.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage reduction of heat transfer in lubricating oil heat exchanger tubes with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17).

(2) Fouling of heat exchanger tubes exposed to treated water

NUREG-1800 item 3.2.2.2.4.2 relates to verification of water chemistry controls to ensure that reduction of heat transfer is adequately managed for stainless steel heat exchanger tubes exposed to treated water.

This item is not applicable to VEGP. The VEGP AMR results for the ESF systems do not include any heat exchanger tubes exposed to treated, but non-borated water. For heat exchanger tubes exposed to borated water, the VEGP AMR results do not predict reduction in heat transfer.

3.2.2.2.5 *Hardening and Loss of Strength due to Elastomer Degradation*

NUREG-1800 item 3.2.2.2.5 relates to elastomer hardening and loss of strength in BWR Standby Gas Treatment System ductwork and filters.

This item is applicable only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

3.2.2.2.6 *Local Loss of Material due to Erosion*

NUREG-1800 item 3.2.2.2.6 relates to erosion of high-pressure safety injection pump minimum flow orifices exposed to borated water due to extended use of this pump for normal charging.

VEGP does not use the safety injection pumps for normal charging, so erosion of the safety injection pump minimum flow orifices is not plausible and the associated NUREG-1801 line item was not used.

3.2.2.2.7 *Loss of Material due to General Corrosion and Fouling*

NUREG-1800 item 3.2.2.2.7 relates to loss of material due to general corrosion and fouling for steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to air - indoor uncontrolled.

This item is applicable only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

3.2.2.2.8 *Loss of material due to General, Pitting, and Crevice Corrosion*

(1) BWR piping component exposed to treated water

NUREG-1800 item 3.2.2.2.8 (1) indicates that loss of material due to general, pitting and crevice corrosion could occur for BWR steel piping components exposed to treated water.

This item is applicable only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(2) Internal surfaces of steel containment isolation piping components

NUREG-1800 item 3.2.2.2.8 (2) indicates that loss of material due to general, pitting and crevice corrosion could occur on the internal surfaces of steel containment isolation piping components exposed to treated water.

While the VEGP AMR methodology predicts loss of material as an aging effect requiring management for steel components exposed to a treated water environment, the VEGP AMR results for ESF systems do not use this line item. Containment isolation piping components are evaluated with their parent system.

(3) Steel piping components exposed to lubricating oil

NUREG-1800 item 3.2.2.2.8 (3) indicates that loss of material due to general, pitting and crevice corrosion could occur in steel piping, piping components, and piping elements exposed to lubricating oil. Oil analysis and a one-time inspection are recommended to manage the aging effect.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage loss of material in ESF system steel piping components exposed to lubricating oil with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection program (Appendix B.3.17).

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

NUREG-1800 Section 3.2.2.2.9 relates to loss of material in steel piping elements exposed to a soil environment. It is noted that the only NUREG-1801 item associated with this further discussion section is for the BWR Standby Gas Treatment System.

While the VEGP AMR methodology predicts loss of material for buried steel components, the VEGP AMR results for ESF systems include any steel piping components exposed to a soil environment.

3.2.2.2.10 *Quality Assurance for Aging Management of Nonsafety-Related Components*

Quality Assurance Program and Administrative Controls are discussed in Section B.1.3

3.2.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the Engineered Safety Features systems mechanical components.

- Metal Fatigue (Section 4.3)

3.2.3 CONCLUSION

The Engineered Safety Features systems piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with the Engineered Safety Features systems are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

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

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-1	Steel and stainless steel piping, piping components, and piping elements in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA (See subsection 3.2.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.2.2.2.1 for further discussion.
3.2.1-2	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, verify that plant-specific program addresses cladding breach (See subsection 3.2.2.2.2)	This item is not applicable to VEGP. The VEGP Centrifugal Charging Pumps, Safety Injection Pumps, and Residual Heat Removal Pumps use solid stainless steel casings. Therefore, loss of material due to cladding breach is not applicable for VEGP. See Section 3.2.2.2.2 for further discussion.
3.2.1-3	Stainless steel containment isolation piping and components internal surfaces exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.3.1)	The VEGP AMR results for ESF systems do not use this item. See Section 3.2.2.2.3(1) for further discussion.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-4	Stainless steel piping, piping components, and piping elements exposed to soil	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific (See subsection 3.2.2.2.3.2)	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include stainless steel piping components exposed to a soil environment. See Section 3.2.2.2.3(2) for further discussion.
3.2.1-5	BWR Only				
3.2.1-6	Stainless steel and copper alloy piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.3.4)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17). See Section 3.2.2.2.3(4) for further discussion.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-7	Partially encased stainless steel tanks with breached moisture barrier exposed to raw water	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated for pitting and crevice corrosion of tank bottoms because moisture and water can egress under the tank due to cracking of the perimeter seal from weathering.	Yes, plant-specific (See subsection 3.2.2.2.3.5)	This item is not applicable to VEGP. See Section 3.2.2.2.3(5) for further discussion.
3.2.1-8	Stainless steel piping, piping components, piping elements, and tank internal surfaces exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant-specific (See subsection 3.2.2.2.3.6)	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include stainless steel piping component or tank internal surfaces exposed to condensation. See Section 3.2.2.2.3(6) for further discussion.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-9	Steel, stainless steel, and copper alloy heat exchanger tubes exposed to lubricating oil	Reduction of heat transfer due to fouling	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.4.1)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17). See Section 3.2.2.2.4(1) for further discussion.
3.2.1-10	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.4.2)	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include stainless steel heat exchanger tubes exposed to treated water (non-borated). See Section 3.2.2.2.4(2) for further discussion.
3.2.1-11	BWR Only				
3.2.1-12	Stainless steel high-pressure safety injection (charging) pump miniflow orifice exposed to treated borated water	Loss of material due to erosion	A plant-specific aging management program is to be evaluated for erosion of the orifice due to extended use of the centrifugal HPSI pump for normal charging.	Yes, plant-specific (See subsection 3.2.2.2.6)	This item is not applicable to VEGP. The VEGP high-pressure safety injection pumps are not used for normal charging. See Section 3.2.2.2.6 for further discussion.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-13	BWR Only				
3.2.1-14	BWR Only				
3.2.1-15	Steel containment isolation piping, piping components, and piping elements internal surfaces exposed to treated water	Loss of material due to general, pitting, and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.8.2)	The VEGP AMR results for ESF systems do not use this item. See Section 3.2.2.2.8(2) for further 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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.2.2.2.8.3)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16). See Section 3.2.2.2.8(3) for further discussion.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-17	Steel (with or without coating or wrapping) piping, piping components, and piping elements buried in soil	Loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion	Buried Piping and Tanks Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated (See subsection 3.2.2.2.9)	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include piping components exposed to soil. See Section 3.2.2.2.9 for further discussion.
3.2.1-18	BWR Only				
3.2.1-19	BWR Only				
3.2.1-20	BWR Only				

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-21	High-strength steel closure bolting exposed to air with steam or water leakage	Cracking due to cyclic loading, stress corrosion cracking	Bolting Integrity	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include high strength bolting. CMTRs for a sample population of A193 Gr. B7 bolting used at VEGP were reviewed and it was concluded that the actual yield strengths of this bolting material do not exceed 150 ksi. VEGP operating experience supports this conclusion.
3.2.1-22	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	The VEGP AMR results for ESF systems do not use this item. The VEGP AMR results include loss of material due to pitting and crevice corrosion for steel closure bolting in air environments when the component temperatures are ≤ 212 ºF. See item 3.2.1-23.
3.2.1-23	Steel bolting and closure bolting exposed to air – outdoor (external), or air – indoor uncontrolled (external)	Loss of material due to general, pitting, and crevice corrosion	Bolting Integrity	No	VEGP manages the aging effect of loss of material air environments when the component temperatures are ≤ 212 ºF with the plant-specific Bolting Integrity Program (Appendix B.3.2).

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-24	Steel closure bolting exposed to air – indoor uncontrolled (external)	Loss of preload due to thermal effects, gasket creep, and self-loosening	Bolting Integrity	No	VEGP manages the aging effect with the plant-specific Bolting Integrity Program (Appendix B.3.2).
3.2.1-25	Stainless steel piping, piping components, and piping elements exposed to closed cycle cooling water >60°C (>140°F)	Cracking due to stress corrosion cracking	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
3.2.1-26	Steel piping, piping components, and piping elements exposed to closed cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include any steel piping components exposed to a closed-cycle cooling water environment. Closed cooling water system piping components are addressed in the Auxiliary Systems.
3.2.1-27	Steel heat exchanger components exposed to closed cycle cooling water	Loss of material due to general, pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Closed Cooling Water Program (Appendix B.3.6).

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-28	Stainless steel piping, piping components, piping elements, and heat exchanger components exposed to closed-cycle cooling water	Loss of material due to pitting and crevice corrosion	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
3.2.1-29	Copper alloy piping, piping components, piping elements, and heat exchanger components exposed to closed cycle cooling water	Loss of material due to pitting, crevice, and galvanic corrosion	Closed-Cycle Cooling Water System	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include any copper alloy piping or heat exchanger components exposed to a closed-cycle cooling water environment.
3.2.1-30	Stainless steel and copper alloy heat exchanger tubes exposed to closed cycle cooling water	Reduction of heat transfer due to fouling	Closed-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Closed Cooling Water Program (Appendix B.3.6).

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-31	External surfaces of steel components including ducting, piping, ducting closure bolting, and containment isolation piping external surfaces exposed to air - indoor uncontrolled (external); condensation (external) and air - outdoor (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8).
3.2.1-32	Steel piping and ducting components and internal surfaces exposed to air – indoor uncontrolled (Internal)	Loss of material due to general corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	Different than NUREG-1801. VEGP will manage the aging effect with the One-Time Inspection Program (Appendix B.3.17).
3.2.1-33	Steel encapsulation components exposed to air-indoor uncontrolled (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to VEGP. The VEGP encapsulation vessels are fabricated from stainless steel, not carbon steel.
3.2.1-34	Steel piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to general, pitting, and crevice corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include steel piping components exposed to internal condensation.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	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	No	The VEGP AMR results for ESF systems do not use this item. While the VEGP AMR methodology predicts loss of material as an aging effect requiring management for steel components exposed to a raw water environment, the VEGP AMR results for ESF systems do not use this line item. Containment isolation piping components are evaluated with their parent system.
3.2.1-36	Steel heat exchanger components exposed to raw water	Loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Generic Letter 89-13 Program (Appendix B.3.12).
3.2.1-37	Stainless steel piping, piping components, and piping elements exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion	Open-Cycle Cooling Water System	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include any stainless steel piping components exposed to raw water.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	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	No	The VEGP AMR results for ESF systems do not use this item. While the VEGP AMR methodology predicts loss of material as an aging effect requiring management for stainless steel components exposed to a raw water environment, the VEGP AMR results for ESF systems do not use this line item. Containment isolation piping components are evaluated with their parent system.
3.2.1-39	Stainless steel heat exchanger components exposed to raw water	Loss of material due to pitting, crevice, and microbiologically-influenced corrosion, and fouling	Open-Cycle Cooling Water System	No	Consistent with NUREG-1801 with aging management program exception. VEGP manages the aging effect of loss of material in the raw water – NSCW environment with the Generic Letter 89-13 Program (Appendix B.3.12).
3.2.1-40	Steel and stainless steel heat exchanger tubes (serviced by open-cycle cooling water) exposed to raw water	Reduction of heat transfer due to fouling	Open-Cycle Cooling Water System	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include steel or stainless steel heat exchanger tubes exposed to raw water – NSCW environment where reduction of heat transfer is an aging effect requiring management.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	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	No	Consistent with NUREG-1801. VEGP will manage the aging effect with the One-Time Inspection Program for Selective Leaching (Appendix B.3.19). While the VEGP AMR results for ESF systems do not include copper alloy piping components or heat exchanger components exposed to closed-cycle cooling water, copper alloy heat exchanger components in auxiliary systems are aligned to this summary item. Components included in this summary item are from Ventilation Systems and the Emergency Diesel Generator System.
3.2.1-42	Gray cast iron piping, piping components, piping elements exposed to closed-cycle cooling water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include gray cast iron piping components exposed to closed-cycle cooling water.
3.2.1-43	Gray cast iron piping, piping components, and piping elements exposed to soil	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include gray cast iron piping components exposed to soil.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-44	Gray cast iron motor cooler exposed to treated water	Loss of material due to selective leaching	Selective Leaching of Materials	No	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include gray cast iron motor cooler components.
3.2.1-45	Aluminum, copper alloy >15% Zn, and steel external surfaces, bolting, and piping, piping components, and piping elements exposed to air with borated water leakage	Loss of material due to Boric acid corrosion	Boric Acid Corrosion	No	Consistent with NUREG-1801 for carbon steel and cast iron. VEGP manages the aging effect with the Boric Acid Corrosion Control Program (Appendix B.3.3). The VEGP AMR results for ESF systems do not include aluminum components or copper alloy components containing greater than 15% Zn.
3.2.1-46	Steel encapsulation components exposed to air with borated water leakage (internal)	Loss of material due to general, pitting, crevice and boric acid corrosion	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	This item is not applicable to VEGP. The VEGP encapsulation vessels are fabricated from stainless steel, not carbon steel.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
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	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include cast austenitic stainless steel piping components which operate at temperatures greater than 482 ºF.
3.2.1-48	Stainless steel or stainless-steel-clad steel piping, piping components, piping elements, and tanks (including safety injection tanks/accumulators) exposed to treated borated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801, with an additional one-time inspection not required by NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). The one-time inspection will confirm that water chemistry control is adequate to manage the aging effect.
3.2.1-49	Stainless steel piping, piping components, piping elements, and tanks exposed to treated borated water	Loss of material due to pitting and crevice corrosion	Water Chemistry	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Water Chemistry Control Program (Appendix B.3.28).

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-50	Aluminum piping, piping components, and piping elements exposed to air-indoor uncontrolled (internal/ external)	None	None	NA - No AEM or AMP	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include aluminum piping components.
3.2.1-51	Galvanized steel ducting exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	This item is not applicable to VEGP. The VEGP AMR results for ESF systems do not include galvanized steel ducting.
3.2.1-52	Glass piping elements exposed to air – indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-53	Stainless steel, copper alloy, and nickel alloy piping, piping components, and piping elements exposed to air – indoor uncontrolled (external)	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.2.1 (Cont'd) Summary of Aging Management Evaluations for Engineered Safety Features in Chapter V of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation	Discussion
3.2.1-54	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	The VEGP AMR results for ESF systems do not include this item. See item 3.2.1-31.
3.2.1-55	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-56	Steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.2.1-57	Stainless steel and copper alloy <15% Zn piping, piping components, and piping elements exposed to air with borated water leakage	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.2.2-1 Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Capillary Tubing (sealed) for CTMT Pressure Sensors	Pressure Boundary	Stainless Steel	Silicone Fluid (Interior)	None	None Required	None	None	G
1b	Capillary Tubing (sealed) for CTMT Pressure Sensors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	V.E-4	3.2.1-23	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-2	3.2.1-45	A
2c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	V.E-5	3.2.1-24	E
2d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
3a	Eductors – CTMT Spray	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
3b	Eductors – CTMT Spray	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A

Table 3.2.2-1 (Cont'd) Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Encapsulation Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
4b	Encapsulation Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
5a	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
5b	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
6a	Motor Coolers – CTMT Spray Pumps (Channel Head)	Pressure Boundary	Carbon Steel	Raw Water – Nuclear Service Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.A-10	3.2.1-36	B
6b	Motor Coolers – CTMT Spray Pumps (Channel Head)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.A-1	3.2.1-31	B
6c	Motor Coolers – CTMT Spray Pumps (Channel Head)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.A-4	3.2.1-45	A
6d	Motor Coolers – CTMT Spray Pumps (Channel Head)	Pressure Boundary	Stainless Steel	Raw Water – Nuclear Service Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.A-8	3.2.1-39	B

Table 3.2.2-1 (Cont'd) Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6e	Motor Coolers – CTMT Spray Pumps (Channel Head)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
7a	Motor Coolers – CTMT Spray Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One–Time Inspection Program	None	None	G
7b	Motor Coolers – CTMT Spray Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.A-1	3.2.1-31	B
7c	Motor Coolers – CTMT Spray Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	V.A-4	3.2.1-45	A
8a	Motor Coolers – CTMT Spray Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Service Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	VII.C1-3	3.3.1-82	B
8b	Motor Coolers – CTMT Spray Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Service Cooling Water (Interior)	Reduction of Heat Transfer	Generic Letter 89-13 Program	VII.C1-6	3.3.1-83	B

Table 3.2.2-1 (Cont'd) Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8c	Motor Coolers – CTMT Spray Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
9a	Motor Coolers – CTMT Spray Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water – Nuclear Service Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	VII.C1-3	3.3.1-82	B
9b	Motor Coolers – CTMT Spray Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
10a	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
10b	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
10c	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Interior)	None	None Required	V.F-14	3.2.1-55	A 201
10d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
10e	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	V.F-14	3.2.1-55	A 201

Table 3.2.2-1 (Cont'd) Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11a	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
11b	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
12a	Pump Casings – CTMT Spray Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
12b	Pump Casings – CTMT Spray Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
13a	Spray Nozzles	Flow Distribution	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
13b	Spray Nozzles	Flow Distribution	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
14a	Tank - Spray Additive Tank (Unit 2 only)	Structural Support	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
14b	Tank - Spray Additive Tank (Unit 2 only)	Structural Support	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	C

Table 3.2.2-1 (Cont'd) Containment Spray System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15a	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
15b	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
15c	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A

Table 3.2.2-2 Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	V.E-4	3.2.1-23	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-2	3.2.1-45	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	V.E-5	3.2.1-24	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-2	3.2.1-45	A
1f	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 202
1g	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1h	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Eductors – RWST Mixing	Structural Support	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2b	Eductors – RWST Mixing	Structural Support	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
3a	Electric Heater Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
3b	Electric Heater Housings	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
4a	Encapsulation Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
4b	Encapsulation Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
5a	Filter Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B
5b	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
5c	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5d	Filter Housings	Pressure Boundary	Cast Iron	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B
5e	Filter Housings	Pressure Boundary	Cast Iron (Gray Cast Iron)	Lube Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program For Selective Leaching	None	None	H
5f	Filter Housings	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
5g	Filter Housings	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
6a	Flexible Connectors	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-24	3.2.1-6	B
6b	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
7a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
7c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
8a	Heat Exchangers – RHR HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
8b	Heat Exchangers – RHR HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
8c	Heat Exchangers – RHR HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
9a	Heat Exchangers – RHR HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9b	Heat Exchangers – RHR HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
9c	Heat Exchangers – RHR HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	V.D1-6	3.2.1-27	B
10a	Heat Exchangers – RHR HXs (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
10b	Heat Exchangers – RHR HXs (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
10c	Heat Exchangers – RHR HXs (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
10d	Heat Exchangers – RHR HXs (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Reduction of Heat Transfer	Closed Cooling Water Program	V.D1-9	3.2.1-30	B 203

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10e	Heat Exchangers – RHR HXs (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Exterior) (T > 140ºF)	Cracking	Closed Cooling Water Program	V.D1-23	3.2.1-25	D
11a	Heat Exchangers – RHR HXs (Tubesheets)	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
11b	Heat Exchangers – RHR HXs (Tubesheets)	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-6	3.2.1-27	B
12a	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.D1-7	3.2.1-36	B
12b	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12c	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
12d	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.D1-5	3.2.1-39	B
12e	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
13a	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13b	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
13c	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
14a	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	VII.C1-3	3.3.1-82	B
14b	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Services Cooling Water (Interior)	Reduction of Heat Transfer	Generic Letter 89-13 Program	VII.C1-6	3.3.1-83	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14c	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
15a	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	VII.C1-3	3.3.1-82	B
15b	Motor Coolers – Centrifugal Charging Pumps, RHR Pumps, SI Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
16a	Motor Coolers – RHR Pumps (Shells)	Pressure Boundary	Copper Alloy	Air – Ventilation (Interior)	None	None Required	None	None	G
16b	Motor Coolers – RHR Pumps (Shells)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	C

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
17a	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.D1-5	3.2.1-39	B
17b	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
18a	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Shells)	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-3	3.4.1-19	B
18b	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
19a	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	VII.C1-3	3.3.1-82	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
19b	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – Nuclear Services Cooling Water (Interior)	Reduction of Heat Transfer	Generic Letter 89-13 Program	VII.C1-6	3.3.1-83	B
19c	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-18	3.2.1-6	D 203
19d	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Lube Oil (Exterior)	Reduction of Heat Transfer	Oil Analysis Program One-Time Inspection Program	V.D1-8	3.2.1-9	B
20a	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubesheets)	Pressure Boundary	Stainless Steel	Raw Water – Nuclear Services Cooling Water (Interior)	Loss of Material	Generic Letter 89-13 Program	V.D1-5	3.2.1-39	B
20b	Oil Coolers – Centrifugal Charging Pumps, SI Pumps (Tubesheets)	Pressure Boundary	Stainless Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-3	3.4.1-19	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
21a	Oil Reservoirs – CCPs & SI Pumps Lube Oil	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
21b	Oil Reservoirs – CCPs & SI Pumps Lube Oil	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B
21c	Oil Reservoirs – CCPs & SI Pumps Lube Oil	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
21d	Oil Reservoirs – CCPs & SI Pumps Lube Oil	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
22a	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D 204
22b	Piping Components	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B
22c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
22d	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
22e	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-8	3.2.1-31	B 205
22f	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
22g	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
22h	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140°F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.D1-31	3.2.1-48	A 206
22i	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Interior)	None	None Required	V.F-14	3.2.1-55	A 207
22j	Piping Components	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	V.F-15	3.2.1-56	A
22k	Piping Components	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-24	3.2.1-6	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
22l	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
22m	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
22n	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A 208
22o	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	V.F-14	3.2.1-55	A 207
23a	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
23b	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
23c	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140°F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.D1-31	3.2.1-48	A 206

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
23d	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
24a	Pump Casings - Centrifugal Charging Pumps, RHR Pumps, Safety Injection Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
24b	Pump Casings - RHR Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140°F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.D1-31	3.2.1-48	A 206
24c	Pump Casings - Centrifugal Charging Pumps, RHR Pumps, Safety Injection Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
25a	Pump Casings - Lube Oil Pumps	Pressure Boundary	Cast Iron	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
25b	Pump Casings - Lube Oil Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
25c	Pump Casings - Lube Oil Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
25d	Pump Casings - Lube Oil Pumps	Pressure Boundary	Copper Alloy	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-18	3.2.1-6	B 203
25e	Pump Casings - Lube Oil Pumps	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
25f	Pump Casings - Lube Oil Pumps	Pressure Boundary	Copper Alloy	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-18	3.2.1-6	B 203
26a	Pump Casings - Sludge Mixing Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
26b	Pump Casings - Sludge Mixing Pumps	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
27a	Seal Water Coolers – RHR Pumps (Covers)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
27b	Seal Water Coolers – RHR Pumps (Covers)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
28a	Seal Water Coolers – RHR Pumps (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	V.D1-6	3.2.1-27	B
28b	Seal Water Coolers – RHR Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
28c	Seal Water Coolers – RHR Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
29a	Seal Water Coolers – RHR Pumps (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
29b	Seal Water Coolers – RHR Pumps (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
29c	Seal Water Coolers – RHR Pumps (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Reduction of Heat Transfer	Closed Cooling Water Program	V.D1-9	3.2.1-30	B 203
30a	Sight Glasses	Pressure Boundary	Glass	Air – Indoor (Interior)	None	None Required	None	None	G
30b	Sight Glasses	Pressure Boundary	Glass	Lube Oil (Interior)	None	None Required	V.F-7	3.2.1-52	A
30c	Sight Glasses	Pressure Boundary	Glass	Air – Indoor (Exterior)	None	None Required	V.F-6	3.2.1-52	A
31a	Tank - Boron Injection Tank (Unit 1 only)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
31b	Tank - Boron Injection Tank (Unit 1 only)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
32a	Tank Liners (& internals) - RWST Liners	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
32b	Tank Liners (& internals) - RWST Liners	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
32c	Tank Liners (& internals) - RWST Liners	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	V.F-14	3.2.1-55	C
33a	Tanks – SI Accumulator Tanks	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
33b	Tanks – SI Accumulator Tanks	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Gas – Dried (Interior)	None	None Required	V.F-15	3.2.1-56	A
33c	Tanks – SI Accumulator Tanks	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
33d	Tanks – SI Accumulator Tanks	Pressure Boundary	Carbon Steel (with Stainless Steel Cladding)	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
34a	Valve Bodies	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-28	3.2.1-16	B
34b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
34c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.D1-1	3.2.1-45	A
34d	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
34e	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.D1-31	3.2.1-48	A 206
34f	Valve Bodies	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	V.F-15	3.2.1-56	A
34g	Valve Bodies	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	V.D1-24	3.2.1-6	B

Table 3.2.2-2 (Cont'd) Emergency Core Cooling System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
34h	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
34i	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Standard Notes for Engineered Safety Features

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.

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

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

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

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

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

Plant Specific Notes for Engineered Safety Features

201. Portions of the containment sump suction lines are protected by guard pipes. These guard pipes are embedded in the containment base mat. The annular space between the guard pipe and the suction pipe is filled with grout.

202. Loss of preload is conservatively considered to be applicable for all closure bolting. NUREG-1801 only addresses loss of preload for bolting in an air - indoor environment.

203. Items V.D1-9 and V.D1-18 are mis-numbered as V.D1-19 in NUREG-1801 Vol. 2.

204. This item represents the interior of the Refueling Water Storage Tank vent shrouds.

205. This item represents the exterior of the Refueling Water Storage Tank vent shrouds.

206. The associated NUREG-1801 Vol. 2 item includes only the Water Chemistry Program. The VEGP aging management strategy includes an additional confirmatory one-time inspection to verify program effectiveness.

207. Portions of the containment sump suction lines are protected by guard pipes. These guard pipes are embedded in the containment base mat. The annular space between the guard pipe and the suction pipe is filled with grout. Portions of other lines, such as the Refueling Water Storage Tank drain line, are also embedded in concrete.

208. This line item represents mixing eductor piping within the Refueling Water Storage Tank and below the normal water level of the tank.

3.3 AGING MANAGEMENT OF AUXILIARY SYSTEMS

3.3.1 INTRODUCTION

This section provides the results of the aging management review of the auxiliary system component groups identified in Tables 2.3.3.1 through 2.3.3.32. The following systems are addressed in this system group (with the applicable Section 2 reference in parentheses):

- Fuel Storage Racks – New and Spent Fuel (Section 2.3.3.1)
- Spent Fuel Cooling and Purification System (Section 2.3.3.2)
- Overhead Heavy and Refueling Load Handling Systems (Section 2.3.3.3)
- Nuclear Service Cooling Water Systems (Section 2.3.3.4)
- Component Cooling Water System (Section 2.3.3.5)
- Auxiliary Component Cooling Water System (Section 2.3.3.6)
- Turbine Plant Cooling Water System (Section 2.3.3.7)
- River Intake Structure System (Section 2.3.3.8)
- Compressed Air Systems (Section 2.3.3.9)
- Chemical and Volume Control and Boron Recycle Systems (Section 2.3.3.10)
- Ventilation Systems – Control Building (CB) (Section 2.3.3.11)
- Ventilation Systems – Auxiliary Building (AB) (Section 2.3.3.12)
- Ventilation Systems – Containment Building (CTB) (Section 2.3.3.13)
- Ventilation Systems – Fuel Handling Building (FHB) (Section 2.3.3.14)
- Ventilation Systems – Diesel Generator Building (Section 2.3.3.15)
- Ventilation Systems – Auxiliary Feedwater Pumphouse (Section 2.3.3.16)
- Ventilation Systems – Miscellaneous (Section 2.3.3.17)
- Ventilation Systems – Radwaste Buildings (Section 2.3.3.18)
- Fire Protection Systems (Section 2.3.3.19)
- Emergency Diesel Generator System (Section 2.3.3.20)
- Demineralized Water System (Section 2.3.3.21)
- Hydrogen Recombiner and Monitoring System (Section 2.3.3.22)
- Drain Systems (Section 2.3.3.23)
- Potable and Utility Water Systems (Section 2.3.3.24)
- Radiation Monitoring System (Section 2.3.3.25)
- Reactor Makeup Water Storage Tank and Degasifier System (Section 2.3.3.26)
- Sampling Systems (Section 2.3.3.27)
- Auxiliary Gas Systems (Section 2.3.3.28)
- Chilled Water Systems (Section 2.3.3.29)
- Waste Management Systems (Section 2.3.3.30)
- Thermal Insulation (Section 2.3.3.31)
- Miscellaneous Leak Detection Systems (Section 2.3.3.32)

Table 3.3.1, "Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801," provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for the auxiliary systems component groups that are relied on for license renewal. Text addressing summary items requiring further evaluation is provided in Section 3.3.2.2.

The format and usage of this Table and the associated further evaluation text is described in Section 3.0.2.

3.3.2 RESULTS

The following tables summarize the results of the aging management reviews for systems in the auxiliary systems group:

Table 3.3.2-1	Fuel Storage Racks: New and Spent Fuel – Summary of Aging Management Review
Table 3.3.2-2	Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review
Table 3.3.2-3	Overhead Heavy & Refueling Load Handling Systems: Summary of Aging Management Review
Table 3.3.2-4	Nuclear Service Cooling Water Systems: Summary of Aging Management Review
Table 3.3.2-5	Component Cooling Water System: Summary of Aging Management Review
Table 3.3.2-6	Auxiliary Component Cooling Water System: Summary of Aging Management Review
Table 3.3.2-7	Turbine Plant Cooling Water System: Summary of Aging Management Review
Table 3.3.2-8	River Intake Structure System: Summary of Aging Management Review
Table 3.3.2-9	Compressed Air Systems: Summary of Aging Management Review
Table 3.3.2-10	Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

Table 3.3.2-11 Ventilation Systems - Control Building (CB): Summary of Aging Management Review

Table 3.3.2-12 Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

Table 3.3.2-13 Ventilation Systems - Containment Building (CTB): Summary of Aging Management Review

Table 3.3.2-14 Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

Table 3.3.2-15 Ventilation Systems - Diesel Generator Building: Summary of Aging Management Review

Table 3.3.2-16 Ventilation Systems – Auxiliary Feedwater Pumphouse: Summary of Aging Management Review

Table 3.3.2-17 Ventilation Systems – Miscellaneous: Summary of Aging Management Review

Table 3.3.2-18 Ventilation Systems – Radwaste Buildings: Summary of Aging Management Review

Table 3.3.2-19 Fire Protection Systems: Summary of Aging Management Review

Table 3.3.2-20 Emergency Diesel Generator System: Summary of Aging Management Review

Table 3.3.2-21 Demineralized Water System: Summary of Aging Management Review

Table 3.3.2-22 Hydrogen Recombiner and Monitoring System: Summary of Aging Management Review

Table 3.3.2-23 Drain Systems: Summary of Aging Management Review

Table 3.3.2-24 Potable and Utility Water Systems: Summary of Aging Management Review

Table 3.3.2-25 Radiation Monitoring System: Summary of Aging Management Review

Table 3.3.2-26 Reactor Makeup Water Storage Tank and Degasifier System: Summary of Aging Management Review

Table 3.3.2-27	Sampling Systems: Summary of Aging Management Review
Table 3.3.2-28	Auxiliary Gas Systems: Summary of Aging Management Review
Table 3.3.2-29	Chilled Water Systems: Summary of Aging Management Review
Table 3.3.2-30	Waste Management Systems: Summary of Aging Management Review
Table 3.3.2-31	Thermal Insulation: Summary of Aging Management Review
Table 3.3.2-32	Miscellaneous Leak Detection System: Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the auxiliary systems in the following Sections:

- Fuel Storage Racks – New and Spent Fuel (Section 3.3.2.1.1)
- Spent Fuel Pool Cooling and Purification System (Section 3.3.2.1.2)
- Overhead Heavy & Refueling Load Handling Systems (Section 3.3.2.1.3)
- Nuclear Service Cooling Water System (Section 3.3.2.1.4)
- Component Cooling Water System (Section 3.3.2.1.5)
- Auxiliary Component Cooling Water System (Section 3.3.2.1.6)
- Turbine Plant Cooling Water System (Section 3.3.2.1.7)
- River Intake Structure System (Section 3.3.2.1.8)
- Compressed Air Systems (Section 3.3.2.1.9)
- Chemical and Volume Control and Boron Recycle Systems (Section 3.3.2.1.10)
- Ventilation Systems – Control Building (CB) (Section 3.3.2.1.11)
- Ventilation Systems – Auxiliary Building (AB) (Section 3.3.2.1.12)
- Ventilation Systems – Containment Building (CTB) (Section 3.3.2.1.13)
- Ventilation Systems – Fuel Handling Building (FHB) (Section 3.3.2.1.14)
- Ventilation Systems – Diesel Generator Building (Section 3.3.2.1.15)
- Ventilation Systems – Auxiliary Feedwater Pumphouse (Section 3.3.2.1.16)
- Ventilation Systems – Miscellaneous (Section 3.3.2.1.17)
- Ventilation Systems – Radwaste Buildings (Section 3.3.2.1.18)
- Fire Protection Systems (Section 3.3.2.1.19)
- Emergency Diesel Generator System (Section 3.3.2.1.20)
- Demineralized Water System (Section 3.3.2.1.21)
- Hydrogen Recombiner and Monitoring System (Section 3.3.2.1.22)
- Drain Systems (Section 3.3.2.1.23)
- Potable and Utility Water Systems (Section 3.3.2.1.24)
- Radiation Monitoring System (Section 3.3.2.1.25)

- Reactor Makeup Water Storage System (Section 3.3.2.1.26)
- Sampling Systems (Section 3.3.2.1.27)
- Auxiliary Gas Systems (Section 3.3.2.1.28)
- Chilled Water Systems (Section 3.3.2.1.29)
- Waste Management Systems (Section 3.3.2.1.30)
- Thermal Insulation (Section 3.3.2.1.31)
- Miscellaneous Leak Detection System (Section 3.3.2.1.32)

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

3.3.2.1.1 *Fuel Storage Racks – New and Spent Fuel Aging Management Review Results*

Materials

The materials of construction for the Fuel Storage Racks – New and Spent Fuel components requiring aging management review are:

- Boral
- Carbon Steel
- Stainless Steel

Environments

Components of the Fuel Storage Racks – New and Spent Fuel are exposed to the following environments:

- Air – Indoor
- Borated Water

Aging Effects Requiring Management

The following aging effects associated with Fuel Storage Racks – New and Spent Fuel components require management:

- Cracking
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Fuel Storage Racks – New and Spent Fuel components:

- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.2 *Spent Fuel Pool Cooling and Purification System Aging Management Review Results*

Materials

The materials of construction for the Spent Fuel Pool Cooling and Purification System components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Spent Fuel Pool Cooling and Purification System are exposed to the following environments:

- Air – Indoor
- Borated Water
- Closed-Cycle Cooling Water

Aging Effects Requiring Management

The following aging effects associated with Spent Fuel Pool Cooling and Purification System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Spent Fuel Pool Cooling and Purification System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.3 *Overhead Heavy & Refueling Load Handling System Aging Management Review Results*

Materials

The materials of construction for the Overhead Heavy and Refueling Load Handling System components requiring aging management review are:

- Carbon Steel

Environments

Components of the Overhead Heavy and Refueling Load Handling System are exposed to the following environments:

- Air – Indoor

Aging Effects Requiring Management

The following aging effects associated with Overhead Heavy and Refueling Load Handling System components requires management:

- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Overhead Heavy and Refueling Load Handling System components:

- Overhead and Refueling Crane Inspection Program (Appendix B.3.20)

3.3.2.1.4 *Nuclear Service Cooling Water System Aging Management Review Results*

Materials

The materials of construction for the Nuclear Service Cooling Water System components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Nickel Alloy
- PVC
- Stainless Steel

Environments

Components of the Nuclear Service Cooling Water System are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Drainage – Dirty
- Lube Oil
- Raw Water – Nuclear Service Cooling Water
- Raw Water – Well Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Nuclear Service Cooling Water System components require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Nuclear Service Cooling Water System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Buried Piping and Tanks Inspection Program (Appendix B.3.4)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.5 *Component Cooling Water System Aging Management Review Results*

Materials

The materials of construction for the Component Cooling Water System components requiring aging management review are:

- Carbon Steel
- Cast Iron
- Copper Alloy
- Stainless Steel

Environments

Components of the Component Cooling Water System are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Closed-Cycle Cooling Water
- Raw Water – Nuclear Service Cooling Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Component Cooling Water System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Component Cooling Water System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.6 ***Auxiliary Component Cooling Water System Aging Management Review Results***

Materials

The materials of construction for the Auxiliary Component Cooling Water System components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Stainless Steel

Environments

Components of the Auxiliary Component Cooling Water System are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Closed-Cycle Cooling Water
- Raw Water – Nuclear Service Cooling Water

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Component Cooling Water System components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Component Cooling Water System components:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)

3.3.2.1.7 *Turbine Plant Cooling Water System Aging Management Review Results*

Materials

The materials of construction for the Turbine Plant Cooling Water System components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Turbine Plant Cooling Water System are exposed to the following environments:

- Air – Indoor
- Raw Water – River Water

Aging Effects Requiring Management

The following aging effects associated with the Turbine Plant Cooling Water System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Turbine Plant Cooling Water System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.8 *River Intake Structure System Aging Management Review Results*

Materials

The materials of construction for the River Intake Structure System components requiring aging management review are:

- Carbon Steel

Environments

Components of the River Intake Structure System are exposed to the following environments:

- Air – Outdoor
- Raw Water – River Water

Aging Effects Requiring Management

The following aging effects associated with the River Intake Structure System components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the River Intake Structure System components:

- Bolting Integrity Program (Appendix B.3.2)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.9 *Compressed Air Systems Aging Management Review Results*

Materials

The materials of construction for the Compressed Air Systems components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Compressed Air Systems are exposed to the following environments:

- Air – Indoor
- Air – Dried

Aging Effects Requiring Management

The following aging effects associated with Compressed Air Systems components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Compressed Air Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)

3.3.2.1.10 *Chemical and Volume Control and Boron Recycle Systems Aging Management Review Results*

Materials

The materials of construction for the Chemical and Volume Control and Boron Recycle Systems components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Elastomer
- Stainless Steel
- PVC

Environments

Components of the Chemical and Volume Control and Boron Recycle Systems are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Borated Water
- Closed-Cycle Cooling Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Chemical and Volume Control and Boron Recycle Systems components require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Erosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Chemical and Volume Control and Boron Recycle Systems components:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Inservice Inspection Program (Appendix B.3.13)
- One-Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.11 *Ventilation Systems - Control Building (CB) Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Control Building components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Elastomer
- Fibers, Foams, Ceramics
- Galvanized Steel
- Stainless Steel

Environments

Components of the Ventilation Systems – Control Building are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Closed-Cycle Cooling Water
- Drainage – Clean

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Control Building components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Leaching
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Control Building components:

- Bolting Integrity Program (Appendix B.3.2)
- Closed Cooling Water System Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.12 *Ventilation Systems - Auxiliary Building (AB) Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Auxiliary Building components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Elastomer
- Fibers, Foams, Ceramics
- Galvanized Steel
- Stainless Steel

Environments

Components of the Ventilation Systems – Auxiliary Building are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Closed-Cycle Cooling Water
- Drainage - Clean
- Raw Water – Nuclear Service Cooling Water

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Auxiliary Building components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Leaching
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Auxiliary Building components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.13 *Ventilation Systems - Containment Building (CTB) Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Containment Building components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Elastomer
- Stainless Steel

Environments

Components of the Ventilation Systems – Containment Building components are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Drainage - Clean
- Raw Water – Nuclear Service Cooling Water

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Containment Building components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Containment Building components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.14 *Ventilation Systems - Fuel Handling Building (FHB) Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Fuel Handling Building components requiring aging management review are:

- Carbon Steel
- Copper Alloy
- Elastomer
- Fiber, Foams, Ceramic
- Galvanized Steel
- Stainless Steel

Environments

Components of the Ventilation Systems – Fuel Handling Building are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Closed-Cycle Cooling Water
- Drainage - Clean

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Fuel Handling Building components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Leaching
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems - Fuel Handling Building components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.15 *Ventilation Systems - Diesel Generator Building Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Diesel Generator Building components requiring aging management review are:

- Carbon Steel
- Elastomer
- Galvanized Steel

Environments

Components of the Ventilation Systems – Diesel Generator Building are exposed to the following environments:

- Air – Indoor
- Air – Ventilation

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Diesel Generator Building components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Diesel Generator Building components:

- Bolting Integrity Program (Appendix B.3.2)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.16 *Ventilation Systems – Auxiliary Feedwater Pumphouse Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Auxiliary Feedwater Pumphouse components requiring aging management review are:

- Carbon Steel
- Galvanized Steel
- Stainless Steel

Environments

Components of the Ventilation Systems – Auxiliary Feedwater Pumphouse are exposed to the following environments:

- Air – Indoor
- Air – Ventilation

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Auxiliary Feedwater Pumphouse components require management:

- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Auxiliary Feedwater Pumphouse components:

- Bolting Integrity Program (Appendix B.3.2)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)

3.3.2.1.17 *Ventilation Systems – Miscellaneous Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Miscellaneous components requiring aging management review are:

- Carbon Steel
- Elastomer
- Galvanized Steel

Environments

Components of the Ventilation Systems – Miscellaneous are exposed to the following environments:

- Air – Indoor
- Air – Ventilation

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Miscellaneous components require management:

- Change in Material Properties
- Loss of Material
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Miscellaneous components:

- Bolting Integrity Program (Appendix B.3.2)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.18 *Ventilation Systems – Radwaste Buildings Aging Management Review Results*

Materials

The materials of construction for the Ventilation Systems – Radwaste Buildings components requiring aging management review are:

- Carbon Steel
- Galvanized Steel

Environments

Components of the Ventilation Systems – Radwaste Buildings are exposed to the following environments:

- Air – Indoor
- Air – Ventilation

Aging Effects Requiring Management

The following aging effects associated with Ventilation Systems – Radwaste Buildings components require management:

- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Ventilation Systems – Radwaste Buildings components:

- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)

3.3.2.1.19 *Fire Protection Systems Aging Management Review Results*

Materials

The materials of construction for the Fire Protection Systems components requiring aging management review are:

- Aluminum Alloy
- Carbon Steel
- Cast Iron
- Copper Alloy
- Galvanized Steel
- Glass
- Lead Alloy
- Stainless Steel

Environments

Components of the Fire Protection Systems are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Concrete
- Diesel Exhaust
- Fuel Oil
- Halon
- Raw Water – Well Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with Fire Protection Systems components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Leaching
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Fire Protection Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Buried Piping and Tanks Inspection Program (Appendix B.3.4)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Fire Protection Program (Appendix B.3.9)
- Diesel Fuel Oil Program (Appendix B.3.7)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.20 *Emergency Diesel Generator System Aging Management Review Results*

Materials

The materials of construction for the Emergency Diesel Generator System components requiring aging management review are:

- Aluminum Alloy
- Carbon Steel
- Cast Iron
- Copper Alloy
- Elastomer
- Stainless Steel

Environments

Components of the Emergency Diesel Generator System are exposed to the following environments:

- Air – Dried
- Air – Indoor
- Air – Outdoor
- Closed-Cycle Cooling Water
- Diesel Exhaust
- Drainage – Dirty
- Fuel Oil
- Lube Oil
- Raw Water – Nuclear Service Cooling Water
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Emergency Diesel Generator System components require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Preload
- Reduction of Heat Transfer
- Loss of Material - Leaching

Aging Management Programs

The following programs manage the aging effects requiring management for the Emergency Diesel Generator System components:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Buried Piping and Tanks Inspection Program (Appendix B.3.4)
- Closed Cooling Water Program (Appendix B.3.6)
- Diesel Fuel Oil Program (Appendix B.3.7)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.21 *Demineralized Water System Aging Management Review Results*

Materials

The materials of construction for the Demineralized Water System components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Demineralized Water System are exposed to the following environments:

- Air – Indoor
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with the Demineralized Water System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Demineralized Water System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- One-Time Inspection Program (Appendix B.3.17)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.22 *Hydrogen Recombiner and Monitoring System Aging Management Review Results*

Materials

The materials of construction for the Hydrogen Recombiner and Monitoring System components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Hydrogen Recombiner and Monitoring System are exposed to the following environments:

- Air – Indoor
- Gas – Dried

Aging Effects Requiring Management

The following aging effects associated with Hydrogen Recombiner and Monitoring System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Hydrogen Recombiner and Monitoring System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)

3.3.2.1.23 *Drain Systems Aging Management Review Results*

Materials

The materials of construction for the Drain Systems components requiring aging management review are:

- Carbon Steel
- Cast Iron
- Copper Alloy
- Lead Alloy
- Polypropylene
- PVC
- Stainless Steel

Environments

Components of the Drain Systems are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Closed-Cycle Cooling Water
- Concrete
- Drainage – Clean
- Drainage – Dirty

Aging Effects Requiring Management

The following aging effects associated with Drain Systems components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Drain Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.24 *Potable and Utility Water Systems Aging Management Review Results*

Materials

The materials of construction for the Potable and Utility Water Systems components requiring aging management review are:

- Carbon Steel
- Cast Iron
- Copper Alloy
- Galvanized Steel

Environments

Components and of the Potable and Utility Water Systems are exposed to the following environments:

- Air – Indoor
- Domestic Water
- Raw Water – Well Water

Aging Effects Requiring Management

The following aging effects associated with Potable and Utility Water Systems components require management:

- Loss of Material
- Loss of Preload
- Loss of Material – Boric Acid Corrosion
- Loss of Material – Leaching

Aging Management Programs

The following programs manage the aging effects requiring management for the Potable and Utility Water Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)

3.3.2.1.25 *Radiation Monitoring System Aging Management Review Results*

Materials

The materials of construction for the Radiation Monitoring System components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Radiation Monitoring System are exposed to the following environments:

- Air – Indoor
- Air – Ventilation
- Air – Outdoor
- Borated Water
- Closed-Cycle Cooling Water
- Drainage – Dirty
- Raw Water – Nuclear Service Cooling Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Radiation Monitoring System components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Radiation Monitoring System components:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- Generic Letter 89-13 Program (Appendix B.3.12)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.26 *Reactor Makeup Water Storage System Aging Management Review Results*

Materials

The materials of construction for the Reactor Makeup Water Storage System components requiring aging management review are:

- Carbon Steel
- Elastomer
- Stainless Steel

Environments

Components of the Reactor Makeup Water Storage System are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Concrete
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Reactor Makeup Water Storage System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Makeup Water Storage System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.27 *Sampling Systems Aging Management Review Results*

Materials

The materials of construction for the Sampling Systems components requiring aging management review are:

- Aluminum Alloy
- Carbon Steel
- Cast Iron
- Copper Alloy
- Galvanized Steel
- Glass
- Nickel Alloy
- Stainless Steel

Environments

Components of the Sampling Systems are exposed to the following environments:

- Air – Indoor
- Borated Water
- Closed-Cycle Cooling Water
- Gas - Miscellaneous
- Raw Water – River Water
- Raw Water – Well Water
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Sampling Systems components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Sampling Systems components:

- ACCW System Carbon Steel Components Program (Appendix B.3.1)
- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.28 *Auxiliary Gas Systems Aging Management Review Results*

Materials

The materials of construction for the Auxiliary Gas Systems components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Auxiliary Gas Systems are exposed to the following environments:

- Air – Indoor
- Gas – Dried

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Gas Systems components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Gas Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)

3.3.2.1.29 *Chilled Water Systems Aging Management Review Results*

Materials

The materials of construction for the Chilled Water Systems components requiring aging management review are:

- Carbon Steel
- Cast Iron
- Copper Alloy
- Glass
- Stainless Steel

Environments

Components of the Chilled Water Systems are exposed to the following environments:

- Air - Indoor
- Closed-Cycle Cooling Water
- Freon
- Lube Oil
- Raw Water – Nuclear Service Cooling Water

Aging Effects Requiring Management

The following aging effects associated with the Chilled Water Systems components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Chilled Water Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Closed Cooling Water Program (Appendix B.3.6)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Generic Letter 89-13 Program (Appendix B.3.12)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- One-Time Inspection Program for Selective Leaching (Appendix B.3.19)

3.3.2.1.30 *Waste Management Systems Aging Management Review Results*

Materials

The materials of construction for the Waste Management Systems components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Waste Management Systems are exposed to the following environments:

- Air – Indoor
- Borated Water
- Drainage – Clean
- Drainage – Dirty
- Gas – Dried

Aging Effects Requiring Management

The following aging effects associated with the Waste Management Systems components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Waste Management Systems components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.3.2.1.31 *Thermal Insulation Aging Management Review Results*

Materials

The materials of construction for Thermal Insulation requiring aging management review are:

- Aluminum Alloy
- Fiber, Foams, Ceramics
- Stainless Steel

Environments

Thermal Insulation components are exposed to the following environments:

- Exposed to Weather
- Protected from the Weather

Aging Effects Requiring Management

The following aging effects associated with Thermal Insulation components require management:

- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Thermal Insulation components:

- External Surfaces Monitoring Program (Appendix B.3.8)

3.3.2.1.32 *Miscellaneous Leak Detection System Aging Management Review Results*

Materials

The materials of construction for the Miscellaneous Leak Detection Systems components requiring aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Miscellaneous Leak Detection System are exposed to the following environments:

- Air – Indoor

Aging Effects Requiring Management

The following aging effects associated with the Miscellaneous Leak Detection System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Miscellaneous Leak Detection System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- One-Time Inspection Program (Appendix B.3.17)

3.3.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Auxiliary Systems

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.3.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.3.2.2.1 *Cumulative Fatigue Damage*

Load handling members subjected to fatigue loading conditions such as crane runways are accounted for by design. In addition, crane use is limited and the number of stress cycles experienced is low in terms of fatigue service life when considering the period of extended operation. Therefore, no TLAA exists for fatigue of these components.

For piping systems, fatigue is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3.2 of this application.

3.3.2.2.2 *Reduction of Heat Transfer due to Fouling*

NUREG-1800 item 3.3.2.2.2 relates to reduction of heat transfer due to fouling for stainless steel heat exchanger tubes exposed to treated water. Applicable items are found only in the BWR Spent Fuel Cooling & Cleanup and Reactor Water Cleanup Systems.

This item is not applicable to VEGP. This item is only applicable to BWRs. VEGP is a Westinghouse PWR.

3.3.2.2.3 *Cracking due to Stress Corrosion Cracking (SCC)*

(1) Cracking of BWR piping components

NUREG-1800 item 3.3.2.2.3 (1) relates to cracking due to SCC in stainless steel piping, piping components, and piping elements of the BWR Standby Liquid Control system.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(2) Cracking in stainless steel and clad heat exchanger components in treated water

NUREG-1800 item 3.3.2.2.3 (2) relates to cracking due to SCC in stainless steel and stainless clad steel heat exchanger components exposed to treated water greater than >140°F in the BWR Reactor Coolant Cleanup system.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(3) Cracking in stainless steel diesel exhaust piping

NUREG-1800 item 3.3.2.2.3 (3) indicates that cracking due to SCC could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. A plant specific program is recommended to manage this effect.

VEGP will manage cracking in stainless steel piping components exposed to diesel exhaust with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

3.3.2.2.4 *Cracking due to Stress Corrosion Cracking and Cyclic Loading*

(1) Cracking of stainless steel non-regenerative heat exchanger components

NUREG-1800 item 3.3.2.2.4 (1) relates to cracking due to SCC in stainless steel PWR non-regenerative heat exchanger components exposed to borated water > 140 ºF. A plant specific program is recommended to verify the effectiveness of the water chemistry control program to manage the aging effect.

VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17).

(2) Cracking of stainless steel regenerative heat exchanger components

NUREG-1800 item 3.3.2.2.4 (2) relates to cracking due to SCC in stainless steel PWR regenerative heat exchanger components exposed to borated water > 140 ºF. A plant specific program is recommended to verify the effectiveness of the water chemistry control program to manage the aging effect.

VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17).

(3) Cracking of stainless steel pump casings in the CVCS system

NUREG-1800 item 3.3.2.2.4 (3) is related to cracking due to SCC and cyclic loading in stainless steel high pressure pump casings in a treated borated water environment in the chemical and volume control system. Further evaluation is recommended by the GALL report (NUREG-1801).

The VEGP high pressure pumps in the CVCS operate at temperatures below the threshold for stress corrosion cracking. Also, because these pumps are centrifugal pumps (not positive displacement), any cyclic loading is not expected to be significant. Therefore, it is concluded this item is not applicable to VEGP.

(4) Cracking of high strength bolting exposed to steam or water leakage

NUREG-1800 item 3.3.2.2.4 (4) relates to cracking of high strength closure bolting for chemical and volume control system bolting exposed to steam or water leakage.

This item is not applicable to VEGP.

The VEGP auxiliary systems do not contain high strength bolting. CMTRs for a sample population of A193 Gr. B7 bolting used at VEGP were reviewed and it was concluded that the actual yield strengths of this bolting material do not exceed 150 ksi. VEGP operating experience supports this conclusion.

3.3.2.2.5 *Hardening and Loss of Strength due to Elastomer Degradation*

(1) Degradation of elastomer seals in HVAC systems

NUREG-1800 item 3.3.2.2.5 (1) relates to hardening and loss of strength due to elastomer degradation of seals and components in HVAC systems. A plant specific aging management program is recommended.

For the VEGP HVAC components aligned with this summary item, VEGP manages the aging effect with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21), the Piping and Duct Internal Inspection Program (Appendix B.3.22), or the External Surfaces Monitoring Program (Appendix B.3.8). The External Surfaces Monitoring Program will manage degradation of the external surfaces of ventilation system elastomer flexible connectors. The Periodic Surveillance and Preventive Maintenance Activities will manage degradation of elastomeric seals in the control room filter units. The Piping and Duct Internal Inspection Program will manage degradation of internal surfaces of ventilation system elastomer flexible connectors.

VEGP components aligned to this summary item as a substitute include the boric acid storage tank diaphragms. The Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21) will manage degradation of the boric acid storage tank diaphragm surfaces exposed to an air – indoor environment.

(2) Degradation of elastomer linings of components in spent fuel pool cooling and cleanup systems.

NUREG-1800 item 3.3.2.2.5 (2) relates to loss of strength due to elastomer degradation of elastomer linings of the filters, valves, and ion exchangers in spent fuel pool cooling and purification systems. A plant specific aging management program is recommended.

VEGP does not have elastomer linings in the Spent Fuel Pool Cooling and Purification System. VEGP components aligned to this summary item as substitutes include the Boric Acid Storage Tank Diaphragms. VEGP will manage degradation of the Boric Acid Storage Tank Diaphragms with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21).

3.3.2.2.6 *Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion*

NUREG-1800 item 3.3.2.2.6 relates to the reduction of neutron-absorbing capacity and loss of material due to general corrosion in the neutron-absorbing sheets of spent fuel storage racks exposed to treated or borated water. A plant specific aging management program is recommended to manage the effects.

VEGP manages loss of material due to corrosion of the aluminum cladding material with the Water Chemistry Control Program (Appendix B.3.28).

Reduction in neutron-absorbing capacity is not an aging effect requiring management for the Boron-Carbide materials. The presence of the aluminum cladding prevents contact of the Boron-Carbide materials with borated water. Additionally, industry and plant-specific operating experience do not indicate degradation of Boral spent fuel storage racks exposed to borated water. Both Virgil C. Summer Nuclear Plant and Brunswick Steam Electric Plant have been evaluated for the aging effect of "reduction of neutron-absorbing capacity" by the NRC staff. The Safety Evaluation Reports for license renewal (NUREG-1787, for Summer, and NUREG-1856, for Brunswick) determined the aging effect to be insignificant. Therefore, it is concluded that "reduction of neutron-absorbing capacity" for Boral does not require aging management. However, the aging effect of loss of material will continue to be managed by the Water Chemistry Program.

3.3.2.2.7 *Loss of Material due to General, Pitting, and Crevice Corrosion*

(1) Steel components exposed to lubricating oil

NUREG-1800 item 3.3.2.2.7 (1) relates to loss of material due to general, pitting, and crevice corrosion for steel piping components, valves, and tanks in the reactor coolant pump (RCP) oil collection system exposed to lubricating oil (Table 3.3.1 item 14). NUREG-1800 recommends control of the lubricating oil environment with a one-time inspection to verify the effectiveness of the lubricating oil program. NUREG-1800 also recommends a one-time inspection to evaluate the thickness of the lower portion of the RCP oil collection tank.

Steel piping components and tanks of the VEGP reactor coolant pump oil collection system are not continuously exposed to a lubricating oil environment that is maintained by the Oil Analysis Program. Therefore this program is not credited for managing loss of material on these components. Instead, these components are managed by the One-Time Inspection Program (Appendix B.3.17). This program will use visual or volumetric NDE techniques to inspect a representative sample of the internal surfaces to assure there is no significant corrosion. In addition, the One-Time Inspection Program will evaluate the thickness of the lower portion of a representative sample of the RCP oil collection tanks. The VEGP reactor coolant pump oil collection system is part of the reactor coolant system. Aging management review results for the reactor coolant oil collection system are presented in Section 3.1.

Consistent with NUREG-1801 with aging management exceptions, steel piping and components in auxiliary systems that are exposed to lubricating oil are managed by the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17).

(2) Loss of material in BWR reactor water cleanup and shutdown cooling systems

NUREG-1800 item 3.3.2.2.7 (2) relates to loss of material BWR systems. This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(3) Loss of material in steel and stainless steel diesel exhaust piping

NUREG-1800 item 3.3.2.2.7 (3) relates to loss of material due to general, pitting, and crevice corrosion in steel and stainless steel diesel exhaust piping components exposed to diesel exhaust. A plant specific aging management program is recommended to manage the effects.

VEGP will manage the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

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

NUREG-1800 item 3.3.2.2.8 relates to loss of material due to general, pitting, crevice corrosion, and microbiologically-influenced corrosion for steel piping components buried in soil.

Consistent with NUREG-1800 with aging management exceptions, VEGP will manage the aging effect with the Buried Piping and Tanks Inspection Program (Appendix B.3.4).

3.3.2.2.9 *Loss of Material due to General, Pitting, Crevice, Microbiologically – Influenced Corrosion and Fouling*

(1) Steel components exposed to fuel oil

NUREG-1800 item 3.3.2.2.9 (1) relates to loss of material due to general, pitting, crevice corrosion, and microbiologically-influenced corrosion for steel piping components and tanks exposed to fuel oil. Corrosion or fouling may occur at locations where contaminants accumulate. A one-time inspection of selected components is recommended to verify the effectiveness of the fuel oil chemistry program.

Consistent with NUREG-1801, VEGP will manage the aging effect in Emergency Diesel Generator System components with the plant-specific Diesel Fuel Oil Program (Appendix B.3.7). Program effectiveness is verified by inspecting selected components where contaminants may accumulate under the One-Time Inspection Program (Appendix B.3.17).

Different than NUREG-1801, VEGP will manage the aging effect in the Emergency Diesel Generator Fuel Oil Storage Tanks with the Diesel Fuel Oil Program and the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21). The Periodic Surveillance and Preventive Maintenance Activities provide for periodic visual inspection of these tanks.

(2) Steel heat exchanger components exposed to lubricating oil

NUREG-1800 item 3.3.2.2.9 (2) relates to loss of material due to general, pitting, crevice corrosion, fouling, and microbiologically-influenced corrosion for steel heat exchanger components exposed to lubricating oil. A one-time inspection is recommended to verify the effectiveness of the lube oil program.

Consistent with NUREG-1801, with aging management program exceptions,

VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and will verify program effectiveness with a one-time inspection of selected components at susceptible locations under the One-Time Inspection Program. (Appendix B.3.17)

3.3.2.2.10 *Loss of Material due to Pitting and Crevice Corrosion*

(1) Elastomer-lined and stainless steel clad components exposed to treated or borated water

NUREG-1800 item 3.3.2.2.10 (1) relates to loss of material due to pitting and crevice corrosion for elastomer lining or stainless steel cladding that are exposed to treated water or borated water if the cladding or lining is degraded. A one-time inspection is recommended to verify the effectiveness of the water chemistry control program.

This summary item is not applicable to VEGP. The VEGP AMR results for the Spent Fuel Pool Cooling and Purification System do not include any elastomer-lined carbon steel components. Other NUREG-1801 Volume 2 items included in this summary item are for a BWR. VEGP is a Westinghouse PWR.

(2) Stainless steel, stainless steel clad steel, and aluminum components exposed to treated water

NUREG-1800 item 3.3.2.2.10 (2) relates to loss of material due to pitting and crevice corrosion for BWR spent fuel pool cooling and cleanup, reactor water cleanup, and shutdown cooling system piping exposed to treated water.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

(3) Copper alloy HVAC components exposed to condensation

NUREG-1800 item 3.3.2.2.10 (3) is related to loss of material due to pitting and crevice corrosion for copper alloy HVAC components exposed to condensation. A plant specific program is recommended to manage the effect.

VEGP will manage loss of material due to condensation on exposed surfaces of copper alloy auxiliary systems components with the External Surfaces Monitoring Program (Appendix B.3.8). For copper alloy surfaces internal to auxiliary systems components and exposed to condensation, VEGP will manage loss of material with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

(4) Copper alloy piping components exposed to lubricating oil

NUREG-1800 item 3.3.2.2.10 (4) relates to loss of material due to pitting and crevice corrosion for copper alloy piping components exposed to lubricating oil. A one-time inspection is recommended to verify the effectiveness of the lubricating oil program.

Consistent with NUREG-1800 with aging management exceptions, VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and verify program effectiveness with a one-time inspection of selected components at susceptible locations under the One-Time Inspection Program (Appendix B.3.17).

(5) Aluminum HVAC and stainless steel components exposed to condensation

NUREG-1800 item 3.3.2.2.10 (5) relates to loss of material due to pitting and crevice corrosion for aluminum piping components and stainless steel ducting and components exposed to condensation. A plant specific program is recommended to manage the effect.

VEGP will manage the aging effect of loss of material on exposed surfaces of stainless steel components exposed to condensation with the External Surfaces Monitoring Program (Appendix B.3.8). For stainless steel bolting exposed to condensation, VEGP will manage the aging effect with the Bolting Integrity Program. (Appendix B.3.2). For surfaces internal to HVAC or other components, VEGP will manage loss of material for stainless steel surfaces exposed to condensation with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

(6) Copper alloy fire protection piping components exposed to condensation

NUREG-1800 item 3.3.2.2.10 (6) relates to loss of material due to pitting and crevice corrosion for copper alloy fire protection system piping components exposed to internal condensation. A plant specific aging management program is recommended to manage the effects.

This item is not applicable to VEGP. The aging management results for Auxiliary Systems do not include copper alloy fire protection piping components exposed to an internal condensation environment.

(7) Stainless steel piping components exposed to soil

NUREG-1800 item 3.3.2.2.10 (7) relates to loss of material due to pitting and crevice corrosion for stainless steel piping components exposed to soil. A plant specific aging management program is recommended to manage the effects.

VEGP will manage the aging effects with the Buried Piping and Tanks Inspection Program (Appendix B.3.4).

(8) Loss of material in BWR standby liquid control system components

NUREG-1800 item 3.3.2.2.10 (8) relates to loss of material for stainless steel piping components exposed to treated water and sodium pentaborate in BWR standby liquid control systems.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

3.3.2.2.11 *Loss of Material due to Pitting, Crevice, and Galvanic Corrosion*

NUREG-1800 item 3.3.2.2.11 relates to loss of material for BWR standby liquid control, spent fuel pool cooling and cleanup, reactor water cleanup, and shutdown cooling system copper alloy piping components exposed to treated water.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

3.3.2.2.12 *Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion*

(1) Stainless steel, aluminum, and copper alloy components exposed to fuel oil

NUREG-1800 item 3.3.2.2.12(1) relates to loss of material due to pitting, crevice corrosion, and MIC for stainless steel, aluminum, and copper alloy piping components exposed to fuel oil. A one-time inspection is recommended to verify the effectiveness of the fuel oil chemistry control program.

For Emergency Diesel Generator System components, VEGP will manage the aging effect with the plant-specific Diesel Fuel Oil Program (Appendix B.3.7). Program effectiveness is verified by with a one-time inspection of selected components at susceptible locations under the One-Time Inspection Program (Appendix B.3.17).

For copper alloy valve bodies in the Fire Protection fuel oil system, VEGP will manage the aging effect with the Diesel Fuel Oil Program (Appendix B.3.7) and the Fire Protection Program. (Appendix B.3.9).

(2) Stainless steel piping components exposed to lubricating oil

NUREG-1800 item 3.3.2.2.12 (2) relates to loss of material due to pitting, crevice corrosion, and MIC in stainless steel piping components exposed to lubricating oil. A one-time inspection is recommended to verify the effectiveness of the lubricating oil program.

Consistent with NUREG-1800, with aging management exceptions, VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17).

3.3.2.2.13 *Loss of Material due to Wear*

NUREG-1800 item 3.3.2.2.13 is related to loss of material due to wear in elastomer seals and components exposed to an air – indoor (uncontrolled) environment.

This item is not applicable to VEGP. The aging management results for Auxiliary Systems to not include elastomer seals exposed to an environment conducive to a loss of material due to wear. See Section 3.3.2.2.5 for discussion of VEGP's aging management of elastomer degradation .

3.3.2.2.14 *Loss of Material due to Cladding Breach*

NUREG-1800 item 3.3.2.2.14 relates to loss of material due to cladding breach for steel charging pump casings with stainless steel cladding exposed to borated water.

This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include any steel pump casings with stainless steel cladding exposed to borated water. The VEGP normal charging pump casings are fabricated from stainless steel, not clad carbon steel.

3.3.2.2.15 *Quality Assurance for Aging Management of Nonsafety-Related Components*

Quality Assurance Program and Administrative Controls are discussed in Section B.1.3

3.3.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the Auxiliary Systems components.

- Metal Fatigue (Section 4.3)

3.3.3 CONCLUSION

The Auxiliary Systems piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with the Auxiliary Systems are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.3.1 Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-1	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 (See subsection 3.3.2.2.1)	Fatigue of structural girder of cranes not considered a TLAA. See further evaluation in Section 3.3.2.2.1.
3.3.1-2	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 (See subsection 3.3.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.3.2.2.1 for further discussion.
3.3.1-3	Stainless steel heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See section 3.3.2.2.2)	This item is not applicable to VEGP. This item is only applicable to BWRs. See Section 3.3.2.2.2 for further discussion.
3.3.1-4	BWR Only				

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-5	Stainless steel and stainless clad steel heat exchanger components exposed to treated water >60°C (>140°F)	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific (See subsection 3.3.2.2.3.2)	This item is not applicable to VEGP. This item is only applicable to BWRs. See Section 3.3.2.2.3(2) for further discussion.
3.3.1-6	Stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust	Cracking due to stress corrosion cracking	Plant specific	Yes, plant specific (See subsection 3.3.2.2.3.3)	VEGP will manage the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22). See Section 3.3.2.2.3(3) for further discussion.
3.3.1-7	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 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, plant specific (See subsection 3.3.2.2.4.1)	VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17). See Section 3.3.2.2.4(1) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-8	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 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, plant specific (See subsection 3.3.2.2.4.2)	VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17). See Section 3.3.2.2.4(2) for further discussion.
3.3.1-9	Stainless steel high-pressure pump casing in PWR chemical and volume control system	Cracking due to stress corrosion cracking and cyclic loading	Water Chemistry 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, plant specific (See subsection 3.3.2.2.4.3)	This item is not applicable to VEGP. See Section 3.3.2.2.4(3) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 The AMP is to be augmented by appropriate inspection to detect cracking if the bolts are not otherwise replaced during maintenance.	Yes, if the bolts are not replaced during maintenance (see Subsection 3.3.2.2.4.4)	This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include high strength bolting. See Section 3.3.2.2.4(4) for further discussion.
3.3.1-11	Elastomer seals and components exposed to air – indoor uncontrolled (internal / external)	Hardening and loss of strength due to elastomer degradation	Plant specific	Yes, plant specific (See subsection 3.3.2.2.5.1)	VEGP will manage the aging effect with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21), the Piping and Duct Internal Inspection Program (Appendix B.3.22), or the External Surfaces Monitoring Program (Appendix B.3.8). See Section 3.3.2.2.5(1) for further 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, plant specific (See subsection 3.3.2.2.5.2)	VEGP will manage the aging effect with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21) or the Piping and Duct Internal Inspection Program (Appendix B.3.22). See Section 3.3.2.2.5(2) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Plant specific	Yes, plant specific (See subsection 3.3.2.2.6)	Different than NUREG-1801. Loss of material due to corrosion in the Boral spent fuel racks is managed by the VEGP Water Chemistry Control Program (Appendix B.3.28). Reduction in neutron-absorbing capacity is not an aging effect requiring management for the Boral spent fuel racks. See Section 3.3.2.2.6 for further 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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.7.1)	Consistent with NUREG-1801 with aging management exceptions. VEGP will manage the aging effect for auxiliary systems components with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17). See Section 3.3.2.2.7(1) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.7.1)	VEGP will manage loss of material in the reactor coolant pump oil collection components exposed to lubricating oil with the One-Time Inspection Program (Appendix B.3.17). The VEGP reactor coolant pump oil collection system is part of the reactor coolant system. Aging management review results for the reactor coolant oil collection system are presented in Section 3.1. See Section 3.3.2.2.7(1) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 and One-Time Inspection to evaluate the thickness of the lower portion of the tank	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.7.1)	VEGP will manage loss of material in the reactor coolant pump oil collection components exposed to lubricating oil with the One-Time Inspection Program (Appendix B.3.17). The VEGP reactor coolant pump oil collection system is part of the reactor coolant system. Aging management review results for the reactor coolant oil collection system are presented in Section 3.1. See Section 3.3.2.2.7(1) for further discussion.
3.3.1-17	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	Plant specific	Yes, plant specific (See subsection 3.3.2.2.7.3)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22). See Section 3.3.2.2.7(3) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated (See subsection 3.3.2.2.8)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Buried Piping and Tank Inspection Program (Appendix B.3.4) See Section 3.3.2.2.8 for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.9.1)	VEGP will manage the aging effect with the Diesel Fuel Oil Program (Appendix B.3.7) and either the One-Time Inspection Program (Appendix B.3.17) or the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21). See Section 3.3.2.2.9(1) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.9.2)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program. (Appendix B.3.17) See Section 3.3.2.2.9(2) for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.10.1)	This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include elastomer lined or stainless steel clad piping. See Section 3.3.2.2.10(1) for further discussion.
3.3.1-23	BWR Only				
3.3.1-24	Stainless steel and aluminum piping, piping components, and piping elements exposed to treated water	Loss of material due to pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.10.2)	This item is not applicable to VEGP. This item is not applicable to PWRs. See Section 3.3.2.2.10(2) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, plant specific (See subsection 3.3.2.2.10.3)	Depending on location, VEGP will manage the aging effect with either the External Surfaces Monitoring Program (Appendix B.3.8) or the Piping and Duct Internal Inspection Program (Appendix B.3.22). See Section 3.3.2.2.10(3) for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.10.4)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program. (Appendix B.3.17). See Section 3.3.2.2.10(4) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, plant specific (See subsection 3.3.2.2.10.5)	Depending on location, VEGP will manage the aging effect of loss of material on stainless steels exposed to condensation with either the External Surfaces Monitoring Program (Appendix B.3.8) or the Piping and Duct Internal Inspection Program (Appendix B.3.22). For stainless steel bolting exposed to condensation, VEGP will manage the aging effect with the Bolting Integrity Program. (Appendix B.3.2). See Section 3.3.2.2.10(5) for further discussion.
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, plant specific (See subsection 3.3.2.2.10.6)	This item is not applicable to VEGP. The aging management results for Auxiliary Systems do not include copper alloy fire protection piping components exposed to internal condensation. See Section 3.3.2.2.10(6) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, plant specific (See subsection 3.3.2.2.10.7)	VEGP will manage the aging effect with the Buried Piping and Tanks Inspection Program (Appendix B.3.4). See Section 3.3.2.2.10(7) for further discussion.
3.3.1-30	BWR Only				
3.3.1-31	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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.12.1)	For Emergency Diesel Generator System components, VEGP will manage the aging effect with the Diesel Fuel Oil Program (Appendix B.3.7) and the One-Time Inspection Program. (Appendix B.3.17). For copper alloy valve bodies in the Fire Protection fuel oil system, VEGP will manage the aging effect with the Diesel Fuel Oil Program (Appendix B.3.7) and the Fire Protection Program. (Appendix B.3.9). See Section 3.3.2.2.12(1) for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.3.2.2.12.2)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17). See Section 3.3.2.2.12(2) for further discussion.
3.3.1-34	Elastomer seals and components exposed to air – indoor uncontrolled (internal or external)	Loss of material due to Wear	Plant specific	Yes, plant specific (See subsection 3.3.2.2.13)	This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include ventilation system elastomer seals exposed to an environment conducive to loss of material due to wear. See Section 3.3.2.2.13 for further discussion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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, verify plant-specific program addresses cladding breach (See subsection 3.3.2.2.14)	This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include clad carbon steel pump casings. See Section 3.3.2.2.14 for further discussion.
3.3.1-36	BWR Only				
3.3.1-37	BWR Only				
3.3.1-38	BWR Only				
3.3.1-39	BWR Only				

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	The VEGP AMR results for auxiliary systems do not use this item. The Fire Protection Diesel Pump Fuel Oil Storage Tank external surfaces are exposed to an air – outside environment. These tanks are small, horizontal cylindrical tanks that do not rest directly on a concrete pad. Instead the tanks are elevated and rest on steel supports. VEGP will manage loss of material with the External Surfaces Monitoring Program. See item 3.3.1-58.
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	No	This item is not applicable to VEGP. The VEGP AMR results for auxiliary systems do not include high strength alloy steel bolting. CMTRs for a sample population of A193 Gr. B7 bolting used at VEGP were reviewed and it was concluded that the actual yield strengths of this bolting material do not exceed 150 ksi. VEGP operating experience supports this conclusion.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-42	Steel closure bolting exposed to air with steam or water leakage	Loss of material due to general corrosion	Bolting Integrity	No	This item is not used by the VEGP AMR results. Exposure to steam or water leakage is not considered to be a normal operating condition. Loss of preload is managed by the Bolting Integrity Program to minimize and correct joint leakage. However, the VEGP AMR results predict loss of material for steel closure bolting. VEGP will manage this aging effect with the Bolting Integrity Program. (Appendix B.3.2).
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	No	VEGP will manage the aging effect with the Bolting Integrity Program. (Appendix B.3.2).
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	No	While there are no VEGP compressed air systems within the scope of license renewal, bolting in the Nuclear Service Cooling Water, Auxiliary Closed Cooling Water, CVCS, and Drain Systems are aligned to this summary item. VEGP will manage corrosion of fasteners in these systems exposed to condensation with the Bolting Integrity Program (Appendix B.3.2).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	VEGP will manage the aging effect with the Bolting Integrity Program. (Appendix B.3.2)
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B. 3.6).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
3.3.1-49	BWR Only				

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Closed Cooling Water Program (Appendix B.3.6).
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	This item is not applicable to VEGP. The aging management results for Auxiliary Systems do not include compressed air piping components exposed to condensation.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	This item is not applicable to VEGP. The aging management results for Auxiliary Systems do not include compressed air piping components exposed to condensation.
3.3.1-55	Steel ducting closure bolting exposed to air – indoor uncontrolled (external)	Loss of material due to general corrosion	External Surfaces Monitoring	No	Different than NUREG-1801. VEGP will manage the aging effect with the Bolting Integrity Program (Appendix B.3.2).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8). However, SNC considers components with normal operating temperatures exceeding 212 °F to be subject to different environmental conditions where moisture does not exist. For these component external surfaces, loss of material due to corrosion is not an aging effect requiring management.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8). However, SNC considers components with normal operating temperatures exceeding 212 °F to be subject to different environmental conditions where moisture does not exist. For these component external surfaces, loss of material due to corrosion is not an aging effect requiring management.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8). However, SNC considers components with normal operating temperatures exceeding 212 °F to be subject to different environmental conditions where moisture does not exist. For these component external surfaces, loss of material due to corrosion is not an aging effect requiring management.
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	No	The VEGP AMR results for auxiliary systems do not use this item. The VEGP AMR results include general, pitting, and crevice corrosion for steel piping components exposed to the air - outdoor environment. See Item 3.3.1-58.
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9).
3.3.1-63	Steel fire rated doors exposed to air – outdoor or air - indoor uncontrolled	Loss of material due to Wear	Fire Protection	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9). VEGP fire doors and radiant energy shields are addressed as structural bulk commodities in Section 3.5.
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 and Fuel Oil Chemistry	No	For Fire Protection diesel fuel oil system piping components, VEGP manages the aging effect with the Diesel Fuel Oil Program (Appendix B.3.7) and the Fire Protection Program (Appendix B.3.9). For the Fire Protection diesel fuel oil storage tanks, aging management additionally includes a one-time inspection of the lower tank surfaces as a part of the One-Time Inspection Program (Appendix B.3.17).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and Structures Monitoring Program	No	VEGP manages aging effects for concrete structural fire barriers with the Fire Protection Program (Appendix B.3.9) and the Structural Monitoring Program (Appendix B.3.32). Concrete fire barrier components are discussed as part of the structural bulk commodities in Section 3.5.
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 and Structures Monitoring Program	No	The VEGP exterior walls and roofs are not rated fire barriers. VEGP manages the aging effect for these structures with the Structural Monitoring Program (Appendix B.3.32) or Inservice Inspection Program - IWL (Appendix B.3.31) depending on component type and its intended functions. These concrete elements are discussed as part of the building structures in Section 3.5.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and Structures Monitoring Program	No	VEGP manages aging effects for concrete structural fire barriers with the Fire Protection Program (Appendix B.3.9) and the Structural Monitoring Program (Appendix B.3.32). Concrete fire barrier components are discussed as bulk commodities in Section 3.5. The VEGP exterior walls and roofs are not rated fire barriers. VEGP manages the aging effect for these structures with the Structural Monitoring Program (Appendix B.3.32) or Inservice Inspection Program - IWL (Appendix B.3.31) depending on component type and its intended functions. These concrete elements are discussed as part of the building structures in Section 3.5.
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Fire Protection Program (Appendix B.3.9).
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	No	The VEGP AMR results for auxiliary systems do not use this item. The VEGP AMR results for auxiliary systems do not include any steel piping components exposed to an internal environment of moist air or condensation. For steel HVAC components exposed to condensation see Item 3.3.1-72.
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Overhead and Refueling Crane Inspection Program (Appendix B.3.20).
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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Overhead and Refueling Crane Inspection Program (Appendix B.3.20).
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	No	The VEGP AMR results for auxiliary systems do not use this item.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions for the Nuclear Service Cooling Water and Emergency Diesel Generator System components exposed to Raw Water – NSCW. VEGP manages the aging effect in these systems with the Generic Letter 89-13 Program (Appendix B.3.12). Different than NUREG-1801 for components exposed to Raw Water – Well Water or Raw Water – River Water. Nuclear Service Water, Turbine Plant Cooling Water, River Intake, Potable and Utility Water, and Sampling System components exposed to the Raw Water – Well Water and Raw Water – River Water environments are aligned to this summary item as a closest available Match. For these components, VEGP will manage the loss of material with the Piping and Duct Internal Inspection Program (Appendix B.3.22).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect for components exposed to nuclear service cooling water with the Generic Letter 89-13 Program (Appendix B.3.12).
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	No	For nickel alloy components, consistent with NUREG-1801 with aging management program exceptions. VEGP manages loss of material in Nuclear Service Water System nickel alloy components with the Generic Letter 89-13 Program (Appendix B.3.12). For copper alloy and stainless steel components, this summary line item overlaps with Items 3.3.1-79 and 3.3.1-81. See those items for the VEGP result.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	For components in auxiliary systems except the Turbine Plant Cooling Water System, the VEGP result is consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect for components exposed to raw water - nuclear service cooling water with the Generic Letter 89-13 Program (Appendix B.3.12). For components in the Turbine Plant Cooling Water System, the AMP credited is different than NUREG-1801. For this system, VEGP will manage the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22)
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	No	The VEGP AMR results for auxiliary systems do not use this item. See items 3.3.1-78, 3.3.1-79, and 3.3.1-81.
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	No	This item is not applicable to VEGP for auxiliary systems. The VEGP AMR results for auxiliary systems do not include copper alloy piping components exposed to raw water – nuclear service cooling water.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions for components exposed to nuclear service cooling water. VEGP manages the aging effect with the Generic Letter 89-13 Program (Appendix B.3.12). Different than NUREG-1801 for the Sampling System Corrosion Product Monitor Shell and Head, which is exposed to river water. VEGP will manage corrosion of this component with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect for components exposed to nuclear service cooling water with the Generic Letter 89-13 Program (Appendix B.3.12).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the One-Time Inspection Program for Selective Leaching (Appendix B.3.19).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the One-Time Inspection Program for Selective Leaching (Appendix B.3.19).

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	The VEGP AMR results do not use this line item. The VEGP new fuel storage racks are fabricated from both carbon steel and stainless steel. Corrosion of the carbon steel portions of the new fuel storage rack assemblies is aligned with summary Item 3.3.1-58. The External Surfaces Monitoring Program will manage the aging effect. There are no aging effects requiring management for the stainless steel portions of the new fuel storage racks. The stainless steel portions of the new fuel racks are aligned to summary Item 3.3.1-94.
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	This item is not applicable to VEGP. The VEGP boraflex panels are not within the scope of license renewal. No credit is taken in criticality analyses for the neutron absorption properties of these panels.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Boric Acid Corrosion Control Program (Appendix B.3.3).
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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Boric Acid Corrosion Control Program (Appendix B. 3.3).
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	No	Consistent with NUREG-1801, with an additional one-time inspection not required by NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B. 3.17). The one-time inspection will confirm that water chemistry control is adequate to manage the aging effect.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Water Chemistry Control Program (Appendix B.3.28)
3.3.1-92	Galvanized steel piping, piping components, and piping elements exposed to air – indoor uncontrolled	None	None	NA - No AEM or AMP	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 - No AEM or AMP	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 - No AEM or AMP	Consistent with NUREG-1801.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 - No AEM or AMP	This item is not applicable to VEGP. The VEGP aging management review process does not use the air – indoor controlled environment. See the appropriate items for the air - indoor uncontrolled environment.
3.3.1-96	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	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 - No AEM or AMP	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 - No AEM or AMP	Consistent with NUREG-1801.

Table 3.3.1 (Cont'd) Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 - No AEM or AMP	Consistent with NUREG-1801.

Table 3.3.2-1 Fuel Storage Racks - New And Spent Fuel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Failed Fuel Rod Storage Basket	Structural Support	Stainless Steel	Borated Water (Exterior) (T > 140°F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.A2-7	3.3.1-90	C 301
1b	Failed Fuel Rod Storage Basket	Structural Support	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
2a	New Fuel Storage Rack Assembly	Reactivity Control Structural Support	Carbon Steel	Air – Indoor (Exterior)	None	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
2b	New Fuel Storage Rack Assembly	Reactivity Control Structural Support	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	C
3a	Spent Fuel Storage Racks	Reactivity Control Structural Support	Boral	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-5	3.3.1-13	I 313
3b	Spent Fuel Storage Racks	Reactivity Control Structural Support	Stainless Steel	Borated Water (Exterior) (T > 140°F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.A2-7	3.3.1-90	A 301

Table 3.3.2-1 (Cont'd)   Fuel Storage Racks - New And Spent Fuel: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3c	Spent Fuel Storage Racks	Reactivity Control Structural Support	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C

Table 3.3.2-2 Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
1e	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Demineralizer Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	C
2b	Demineralizer Vessels	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
3a	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3b	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
4a	Heat Exchangers - SFP HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	C

Table 3.3.2-2 (Cont'd) Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4b	Heat Exchangers - SFP HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
5a	Heat Exchangers - SFP HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
5b	Heat Exchangers - SFP HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5c	Heat Exchangers - SFP HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.A3-3	3.3.1-48	B
6a	Heat Exchangers - SFP HXs (Tubes)	Exchange Heat Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
6b	Heat Exchangers - SFP HXs (Tubes)	Exchange Heat Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.C2-3	3.3.1-52	B

Table 3.3.2-2 (Cont'd) Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Heat Exchangers - SFP HXs (Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
7b	Heat Exchangers - SFP HXs (Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.A-7	3.2.1-28	B
8a	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
8b	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
9a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
9b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
10a	Pump Casings - Refuel Wtr Purification Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-2 (Cont'd) Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10b	Pump Casings - Refuel Wtr Purification Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
11a	Pump Casings - SFP Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
11b	Pump Casings - SFP Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
12a	Pump Casings - SFP Skimmer Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
12b	Pump Casings - SFP Skimmer Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
13	Strainer Elements	Debris Protection	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
14a	Strainer Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
14b	Strainer Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
14c	Strainer Housings	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A

Table 3.3.2-2 (Cont'd) Spent Fuel Pool Cooling and Purification System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15a	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
15b	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A

Table 3.3.2-3 Overhead Heavy and Refueling Load Handling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1	Baseplates and anchors for attachment to structures, and retaining clips	Structural Support	Carbon Steel	Air – Indoor	Loss of Material	Overhead and Refueling Crane Inspection Program	III.B5-7	3.5.1-39	E
2	Crane (including bridge and trolley) Structural Girders	Structural Support	Carbon Steel	Air – Indoor	Loss of Material	Overhead and Refueling Crane Inspection Program	VII.B-3	3.3.1-73	A
3	Crane Rails	Structural Support	Carbon Steel	Air – Indoor	Loss of Material	Overhead and Refueling Crane Inspection Program	VII.B-1	3.3.1-74	A 304

Table 3.3.2-4 Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.D-1	3.3.1-44	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	Bolting Integrity Program	None	None	G 315
1f	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
1g	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
1h	Closure Bolting	Pressure Boundary	Carbon Steel	Raw Water - NSCW	Loss of Material	GL 89-13 Program	VII.C1-19	3.3.1-76	A 319

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1i	Closure Bolting	Pressure Boundary	Carbon Steel	Raw Water - NSCW	Loss of Preload	Bolting Integrity Program	None	None	G 309 319
1j	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.F1-1	3.3.1-27	E
1k	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1l	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	Bolting Integrity Program	None	None	H 315
1m	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1n	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Cracking	Bolting Integrity Program	None	None	G 315
2a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
2c	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G
2d	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
2e	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
2f	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Raw Water - NSCW	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
3b	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat	Copper Alloy	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-8	3.3.1-26	D
3c	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat	Copper Alloy	Lube Oil (Exterior)	Reduction of Heat Transfer	Oil Analysis Program One-Time Inspection Program	VIII.G-8	3.4.1-10	B
3d	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
3e	Oil Coolers - NSCW Pumps Thrust Bearings (Coils)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B
4a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4c	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
4d	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
4e	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
4f	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-19	3.3.1-76	B
4g	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
4h	Piping Components	Pressure Boundary	Ni Alloy	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	None	None	G
4i	Piping Components	Pressure Boundary	Ni Alloy	Air – Indoor (Exterior)	None	None Required	VII.J-14	3.3.1-94	A
4j	Piping Components	Pressure Boundary	Ni Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-13	3.3.1-78	B
4k	Piping Components	Pressure Boundary	PVC	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	F 303

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4l	Piping Components	Pressure Boundary	PVC	Air – Outdoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	F 303
4m	Piping Components	Pressure Boundary	PVC	Drainage - Dirty (Interior)	Change in Material Properties	One-Time Inspection Program	None	None	F 303
4n	Piping Components	Pressure Boundary	PVC	Raw Water - NSCW (Interior)	Change in Material Properties	One-Time Inspection Program	None	None	F 303
4o	Piping Components	Pressure Boundary	PVC	Soil (Exterior)	None	None Required	None	None	F
4p	Piping Components	Pressure Boundary	PVC	Treated Water (Interior)	None	None Required	None	None	F
4q	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
4r	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E
4s	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4t	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4u	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
4v	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
4w	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
4x	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Exterior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
4y	Piping Components	Pressure Boundary	Stainless Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.C1-16	3.3.1-29	E 302
5a	Pump Casings - NSCW System Pumps	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
5b	Pump Casings - NSCW System Pumps	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
5c	Pump Casings - NSCW System Pumps	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Exterior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
6a	Pump Casings - NSCW Transfer Pumps	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6b	Pump Casings - NSCW Transfer Pumps	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
6c	Pump Casings - NSCW Transfer Pumps	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
6d	Pump Casings - NSCW Transfer Pumps	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Exterior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
7a	Spray Nozzles	Flow Distribution	Copper Alloy	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
7b	Spray Nozzles	Flow Distribution	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-2	3.3.1-78	B
8a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
8b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
8c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
8d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B

Table 3.3.2-4 (Cont'd) Nuclear Service Cooling Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8e	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-19	3.3.1-76	B
8f	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
8g	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E
8h	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
8i	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G
8j	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G 315
8k	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
8l	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-7 VII.C1-15	3.3.1-78 3.3.1-79	B
8m	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C3-7	3.3.1-78	B

Table 3.3.2-5 Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1e	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
2b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
3a	Heat Exchangers - CCW HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3b	Heat Exchangers - CCW HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B
4a	Heat Exchangers - CCW HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
4b	Heat Exchangers - CCW HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
5a	Heat Exchangers - CCW HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
5b	Heat Exchangers - CCW HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.C2-2	3.3.1-52	B
5c	Heat Exchangers - CCW HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
5d	Heat Exchangers - CCW HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6a	Heat Exchangers - CCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
6b	Heat Exchangers - CCW HXs (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
7a	Motor Coolers - CCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
7b	Motor Coolers - CCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B
8a	Motor Coolers - CCW Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
8b	Motor Coolers - CCW Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
9a	Motor Coolers - CCW Pumps (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F1-16	3.3.1-25	E

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9b	Motor Coolers - CCW Pumps (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
9c	Motor Coolers - CCW Pumps (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B
10a	Motor Coolers - CCW Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior)	None	None Required	None	None	G
10b	Motor Coolers - CCW Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
11a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
11b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
11c	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
11d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11e	Piping Components	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
11f	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
12a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
12b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
12c	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
13a	Pump Casings - CCW Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13b	Pump Casings - CCW Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
13c	Pump Casings - CCW Pumps	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
14a	Tanks - CCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
14b	Tanks - CCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
14c	Tanks - CCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
14d	Tanks - CCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
15a	Tanks - CCW Surge Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
15b	Tanks - CCW Surge Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15c	Tanks - CCW Surge Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
16b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
16c	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16d	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
16e	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
16f	Valve Bodies	Pressure Boundary	Cast Iron	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16g	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Closed-Cycle Cooling Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.C2-8	3.3.1-85	B

Table 3.3.2-5 (Cont'd) Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16h	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
16i	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
16j	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A

Table 3.3.2-6 Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.D-1	3.3.1-44	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1e	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.F1-1	3.3.1-27	E
1f	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1g	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.F1-1	3.3.1-27	E
1h	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E
2b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
2c	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior) (T > 140ºF)	Cracking	Closed Cooling Water Program	VII.C2-11	3.3.1-46	B
2d	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
3a	Heat Exchangers - ACCW HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
3b	Heat Exchangers - ACCW HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3c	Heat Exchangers - ACCW HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B
4a	Heat Exchangers - ACCW HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
4b	Heat Exchangers - ACCW HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
4c	Heat Exchangers - ACCW HXs (Shells)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
4d	Heat Exchangers - ACCW HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
5a	Heat Exchangers - ACCW HXs (Tubes)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Heat Exchangers - ACCW HXs (Tubes)	Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
6a	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
6b	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
6c	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Exterior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
6d	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
6e	Heat Exchangers - ACCW HXs (Tubesheets)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Motor Coolers - ACCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
7b	Motor Coolers - ACCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
7c	Motor Coolers - ACCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
7d	Motor Coolers - ACCW Pumps (Channel Heads)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
8a	Motor Coolers - ACCW Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
8b	Motor Coolers - ACCW Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
8c	Motor Coolers - ACCW Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Motor Coolers - ACCW Pumps (Tubes)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior)	None	None Required	None	None	G
9b	Motor Coolers - ACCW Pumps (Tubes)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
10a	Motor Coolers - ACCW Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior)	None	None Required	None	None	G
10b	Motor Coolers - ACCW Pumps (Tubesheets)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
11a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
11b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
11c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11d	Piping Components	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
11e	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
11f	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E
11g	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
11h	Piping Components	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
12a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
12b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12c	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
12d	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
13a	Pump Casings - ACCW Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
13b	Pump Casings - ACCW Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
13c	Pump Casings - ACCW Pumps	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
13d	Pump Casings - ACCW Pumps	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
14a	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14b	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
14c	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
14d	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
14e	Tanks - ACCW Chem Add Feeder Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
15a	Tanks - ACCW Surge Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
15b	Tanks - ACCW Surge Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
15c	Tanks - ACCW Surge Tanks	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15d	Tanks - ACCW Surge Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
16b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
16c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
16d	Valve Bodies	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
16e	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16f	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-1	3.3.1-27	E
16g	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-6 (Cont'd) Auxiliary Component Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16h	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior) (T > 140ºF)	Cracking	Closed Cooling Water Program	VII.C2-11	3.3.1-46	B
16i	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B

Table 3.3.2-7 Turbine Plant Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2a	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
2b	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-15	3.3.1-79	E
3a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
3b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
3c	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-7 (Cont'd) Turbine Plant Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3e	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-15	3.3.1-79	E
4a	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4b	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
4c	Strainer Housings	Pressure Boundary	Carbon Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
5a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
5b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5c	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-7 (Cont'd) Turbine Plant Cooling Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5d	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5e	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-15	3.3.1-79	E

Table 3.3.2-8 River Intake Structure System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	Bolting Integrity Program	None	None	G
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-01	3.3.1-43	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
2a	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
2b	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G
2c	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
2d	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
3a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B

Table 3.3.2-8 (Cont'd) River Intake Structure System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G
3c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
3d	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - River Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-9 Compressed Air Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air - Dried (Interior)	None	None Required	VII.J-18	3.3.1-98	A
2b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3a	Piping Components	Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-22	3.3.1-98	A
3b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-9 (Cont'd) Compressed Air Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
3d	Piping Components	Pressure Boundary	Stainless Steel	Air - Dried (Interior)	None	None Required	VII.J-18	3.3.1-98	A
3e	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4a	Valve Bodies	Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-22	3.3.1-98	A
4b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
4d	Valve Bodies	Pressure Boundary	Stainless Steel	Air - Dried (Interior)	None	None Required	VII.J-18	3.3.1-98	A
4e	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-10 Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	V.E-4	3.2.1-23	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.D-1	3.3.1-44	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-2	3.2.1-45	A
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	V.E-5	3.2.1-24	E
1e	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Demineralizer Vessels	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
2b	Demineralizer Vessels	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
3a	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
3b	Filter Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3c	Filter Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.A-28	3.2.1-48	A 301
3d	Filter Housings	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
4a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
4b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.A-28	3.2.1-48	A 301
4c	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
5a	Heat Exchangers - Excess Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Heat Exchangers - Excess Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
5c	Heat Exchangers - Excess Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
6a	Heat Exchangers - Excess Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
6b	Heat Exchangers - Excess Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A
6c	Heat Exchangers - Excess Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
6d	Heat Exchangers - Excess Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Heat Exchangers - Excess Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
7b	Heat Exchangers - Excess Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
7c	Heat Exchangers - Excess Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior) (T > 140ºF)	Cracking	Closed Cooling Water Program	V.D1-23	3.2.1-25	D
7d	Heat Exchangers - Excess Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
8a	Heat Exchangers - Letdown Chillers (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
8b	Heat Exchangers - Letdown Chillers (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Heat Exchangers-Letdown Chiller (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
9b	Heat Exchangers-Letdown Chiller (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	V.E-10	3.2.1-31	B
9c	Heat Exchangers-Letdown Chiller (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A
9d	Heat Exchangers-Letdown Chiller (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
9e	Heat Exchangers-Letdown Chiller (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
10a	Heat Exchangers - Letdown Chillers (Tubes)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10b	Heat Exchangers - Letdown Chillers (Tubes)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
11a	Heat Exchangers - Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
11b	Heat Exchangers - Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
11c	Heat Exchangers - Letdown HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
12a	Heat Exchangers - Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
12b	Heat Exchangers - Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12c	Heat Exchangers - Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
12d	Heat Exchangers - Letdown HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
13a	Heat Exchangers - Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
13b	Heat Exchangers - Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
13c	Heat Exchangers - Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior) (T > 140ºF)	Cracking	Closed Cooling Water Program	V.D1-23	3.2.1-25	D
13d	Heat Exchangers - Letdown HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14a	Heat Exchangers - Letdown Reheat HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
14b	Heat Exchangers - Letdown Reheat HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
14c	Heat Exchangers - Letdown Reheat HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
15a	Heat Exchangers - Letdown Reheat HXs (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
15b	Heat Exchangers - Letdown Reheat HXs (Shells)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
15c	Heat Exchangers - Letdown Reheat HXs (Shells)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16a	Heat Exchangers - Letdown Reheat HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
16b	Heat Exchangers - Letdown Reheat HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
16c	Heat Exchangers - Letdown Reheat HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
17a	Heat Exchangers - Moderating HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
17b	Heat Exchangers - Moderating HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
17c	Heat Exchangers - Moderating HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Heat Exchangers - Moderating HXs (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
18b	Heat Exchangers - Moderating HXs (Shells)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
19a	Heat Exchangers - Moderating HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
19b	Heat Exchangers - Moderating HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
19c	Heat Exchangers - Moderating HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
20a	Heat Exchangers - Regenerative HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20b	Heat Exchangers - Regenerative HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
20c	Heat Exchangers - Regenerative HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
21a	Heat Exchangers - Regenerative HXs (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
21b	Heat Exchangers - Regenerative HXs (Shells)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E
21c	Heat Exchangers - Regenerative HXs (Shells)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
22a	Heat Exchangers - Regenerative HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-5	3.3.1-8	E

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
22b	Heat Exchangers - Regenerative HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
22c	Heat Exchangers - Regenerative HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Exterior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	C
23a	Heat Exchangers - Seal Water HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
23b	Heat Exchangers - Seal Water HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
23c	Heat Exchangers - Seal Water HXs (Channel Heads)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
24a	Heat Exchangers - Seal Water HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
24b	Heat Exchangers - Seal Water HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A
24c	Heat Exchangers - Seal Water HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
24d	Heat Exchangers - Seal Water HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
25a	Heat Exchangers - Seal Water HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-9	3.3.1-7	E
25b	Heat Exchangers - Seal Water HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	C
25c	Heat Exchangers - Seal Water HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior) (T > 140ºF)	Cracking	Closed Cooling Water Program	V.D1-23	3.2.1-25	D

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
25d	Heat Exchangers - Seal Water HXs (Tubes & Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
26a	Letdown Orifices	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
26b	Letdown Orifices	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.A-28	3.2.1-48	A 301
26c	Letdown Orifices	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.A-27	3.2.1-49	A
26d	Letdown Orifices	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water (Interior) (High ΔP)	Loss of Material - Erosion	Inservice Inspection Program	None	None	H 321

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
27a	Motor Coolers - Normal Charging Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
27b	Motor Coolers - Normal Charging Pumps (Channel Heads)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	V.D1-4	3.2.1-28	B
28a	Motor Coolers - Normal Charging Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
28b	Motor Coolers - Normal Charging Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
28c	Motor Coolers - Normal Charging Pumps (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A
29a	Motor Coolers - Normal Charging Pumps (Tubes)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F1-16	3.3.1-25	E
29b	Motor Coolers - Normal Charging Pumps (Tubes)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
30a	Motor Coolers - Normal Charging Pumps (Tubesheets)	Pressure Boundary	Stainless Steel	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F1-1	3.3.1-27	E
30b	Motor Coolers - Normal Charging Pumps (Tubesheets)	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
31a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
31b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	V.E-10	3.2.1-31	B
31c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.E1-1	3.3.1-89	A
31d	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
31e	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
31f	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
31g	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-20	3.3.1-90	A
31h	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
31i	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior) (High ΔP)	Loss of Material - Erosion	Inservice Inspection Program	None	None	H 321
32a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
32b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	V.D1-31	3.2.1-48	A 301

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
32c	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	V.D1-30	3.2.1-49	A
33a	Pump Casings - Boric Acid Transfer Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
33b	Pump Casings - Boric Acid Transfer Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
34a	Pump Casings - CVCS Recycle Feed Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
34b	Pump Casings - CVCS Recycle Feed Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
35a	Pump Casings - Normal Charging Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
35b	Pump Casings - Normal Charging Pumps	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
36a	Pump Casings - Zinc Add'n Injection Pumps	Pressure Boundary	PVC	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	F 303
36b	Pump Casings - Zinc Add'n Injection Pumps	Pressure Boundary	PVC	Treated Water (Interior)	None	None Required	None	None	F
37a	Tank Diaphragms - Boric Acid Storage Tanks	Physical Integrity	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	VII.F1-7	3.3.1-11	E 305
37b	Tank Diaphragms - Boric Acid Storage Tanks	Physical Integrity	Elastomer	Borated Water (Interior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	VII.A3-1	3.3.1-12	E 305
38a	Tanks - Boric Acid Batching Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
38b	Tanks - Boric Acid Batching Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
39a	Tanks - Boric Acid Storage Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
39b	Tanks - Boric Acid Storage Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
40a	Tanks - Boron Meter Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
40b	Tanks - Boron Meter Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
41a	Tanks - Chemical Mixing Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
41b	Tanks - Chemical Mixing Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
42a	Tanks - Recycle Holdup Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
42b	Tanks - Recycle Holdup Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
43a	Tanks - Volume Control Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
43b	Tanks - Volume Control Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
44a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B

Table 3.3.2-10 (Cont'd) Chemical and Volume Control and Boron Recycle Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
44b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	V.E-10	3.2.1-31	B
44c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.E1-1	3.3.1-89	A
44d	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
44e	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
44f	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
44g	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-20	3.3.1-90	A
44h	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A

Table 3.3.2-11 Ventilation Systems - Control Building (CB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	AC Units (ESF) Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B
1b	AC Units (ESF) Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F1-4	3.3.1-55	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2c	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
3a	Control Rm Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B
3b	Control Rm Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
3c	Control Rm Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3d	Control Rm Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H

Table 3.3.2-11 (Cont'd) Ventilation Systems - Control Building (CB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4	Control Rm Filter and Fan Unit Moisture Eliminators	Moisture Elimination	Fibers, Foams, Ceramics	Air – Ventilation (Exterior)	None	None Required	None	None	F
5a	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F1-16	3.3.1-25	B
5b	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F1-16	3.3.1-25	E
5c	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F1-8	3.3.1-51	B
5d	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.F1-12	3.3.1-52	B
6a	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
6b	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F2-9	None	B

Table 3.3.2-11 (Cont'd) Ventilation Systems - Control Building (CB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14	3.3.1-25	B
6d	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F1-16	3.3.1-25	E
6e	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F1-8	3.3.1-51	B
6f	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior) (Zn > 15%)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	V.A-6	3.2.1-41	B
7a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B
7b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
8a	Duct Silencer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B
8b	Duct Silencer Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
9a	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A

Table 3.3.2-11 (Cont'd) Ventilation Systems - Control Building (CB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C
9c	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
9d	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
10a	Fan Housings	Missile Barrier Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B 312
10b	Fan Housings	Missile Barrier Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
11a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F2-7	3.3.1-11	E 305 316
11b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316
12a	Heater Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B

Table 3.3.2-11 (Cont'd) Ventilation Systems - Control Building (CB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12b	Heater Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
13a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-2	3.3.1-56	B
13b	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
13c	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
13d	Piping Components	Pressure Boundary	Copper Alloy	Air – Ventilation (Interior)	None	None Required	None	None	G
14	Sealants	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	VII.F1-7	3.3.1-11	E 305

Table 3.3.2-12 Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F2-4	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
2b	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F2-13	3.3.1-51	B
2c	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.F2-10	3.3.1-52	B

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2d	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F2-1	3.3.1-27	B
2e	Cooling Coils (Essential Chilled Water)	Pressure Boundary Exchange Heat	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VIII.F-1	3.4.1-25	B
3a	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
3b	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F2-9	None	B
3c	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14	3.3.1-25	B
3d	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
3e	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F1-8	3.3.1-51	B

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3f	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior) (Zn > 15%)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	V.A-6	3.2.1-41	B
4a	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E
4b	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
4c	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B
4d	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F2-1	3.3.1-27	B
4e	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	V.A-8	3.2.1-39	B
5a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5c	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
6a	Ductwork & Fittings	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
6b	Ductwork & Fittings	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
6c	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C
6d	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6e	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
7a	Fan Housings	Missile Barrier	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B 312

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7b	Fan Housings	Missile Barrier	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A 312
7c	Fan Housings	Missile Barrier	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
8a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F2-7	3.3.1-11	E 305 316
8b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316
9a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B
9b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
9c	Piping Components	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-3	3.3.1-72	B

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9d	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
9e	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
9f	Piping Components	Pressure Boundary	Copper Alloy	Air – Ventilation (Interior)	None	None Required	None	None	G
10a	Piping Penetration Area Cooler Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B
10b	Piping Penetration Area Cooler Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
10c	Piping Penetration Area Cooler Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
10d	Piping Penetration Area Cooler Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-3	3.3.1-72	B
11a	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11b	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
11c	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
11d	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
11e	Piping Penetration Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
12	Piping Penetration Filter and Fan Unit Moisture Eliminators	Moisture Elimination	Fibers, Foams, Ceramics	Air – Ventilation (Exterior)	None	None Required	None	None	F
13a	Room Cooler Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-12 (Cont'd) Ventilation Systems - Auxiliary Building (AB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13b	Room Cooler Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
13c	Room Cooler Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-3	3.3.1-72	B
13d	Room Cooler Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B

Table 3.3.2-13 Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F3-4	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2a	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F3-16	3.3.1-25	E 320
2b	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B 320
2c	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water – NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B 320
2d	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Stainless Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F3-1	3.3.1-27	E 320

Table 3.3.2-13 (Cont'd) Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2e	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	V.A-8	3.2.1-39	B 320
2f	Cooling Coils (NSCW)	Pressure Boundary Exchange Heat	Stainless Steel	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-7	3.3.1-83	B 320
3a	CTB Aux Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B 312
3b	CTB Aux Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A 312
3c	CTB Aux Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
4a	CTB Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B
4b	CTB Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
4c	CTB Cooling Unit Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G

Table 3.3.2-13 (Cont'd) Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B
5b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5c	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
5d	Damper Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5e	Damper Housings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
6a	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6b	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
7a	Fan Housings	Missile Barrier Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B 312
7b	Fan Housings	Missile Barrier Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A 312

Table 3.3.2-13 (Cont'd) Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7c	Fan Housings	Missile Barrier Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
7d	Fan Housings	Missile Barrier Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A 312
7e	Fan Housings	Missile Barrier Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H 312
8a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F3-7	3.3.1-11	E 305 316
8b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316
8c	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
8d	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H

Table 3.3.2-13 (Cont'd) Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
9b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
10a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B
10b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
10c	Piping Components	Pressure Boundary	Carbon Steel	Drainage – Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
10d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
10e	Piping Components	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
11a	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-13 (Cont'd) Ventilation Systems – Containment Building (CTB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11b	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Ventilation	None	None Required	None	None	H

Table 3.3.2-14 Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F2-4	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
2b	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F2-9	None	B
2c	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.F2-14	3.3.1-25	B
2d	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Air – Ventilation (Exterior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F2-14	3.3.1-25	E

Table 3.3.2-14 (Cont'd) Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2e	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.F1-8	3.3.1-51	B
2f	Cooling Coils (Normal Chilled Water)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior) (Zn > 15%)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	V.A-6	3.2.1-41	B
3a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B
3b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
3c	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
4a	Ductwork & Fittings	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
4b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
4c	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C

Table 3.3.2-14 (Cont'd) Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4d	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4e	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
5a	Fan Housings	Missile Barrier	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B 312
5b	Fan Housings	Missile Barrier	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A 312
5c	Fan Housings	Missile Barrier	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
6a	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F2-2	3.3.1-56	B
6b	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-14 (Cont'd) Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
6d	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6e	FHB Post-Accident Filter and Fan Unit Housings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
7	FHB Post-Accident Filter and Fan Unit Moisture Eliminators	Moisture Elimination	Fibers, Foams, Ceramics	Air – Ventilation (Exterior)	None	None Required	None	None	F
8a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F2-7	3.3.1-11	E 305 316
8b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316

Table 3.3.2-14 (Cont'd) Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B
9b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
9c	Piping Components	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior) (Condensation)	Loss of Material	Piping and Duct Internal Inspection Program	VII.F3-3	3.3.1-72	B
9d	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
9e	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
9f	Piping Components	Pressure Boundary	Copper Alloy	Air – Ventilation (Interior)	None	None Required	None	None	G
9g	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
9h	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-14 (Cont'd) Ventilation Systems - Fuel Handling Building (FHB): Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10a	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
10b	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H

Table 3.3.2-15 Ventilation System - Diesel Generator Building: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F4-3	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
2b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
3a	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
3b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C
4a	Fan Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
4b	Fan Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
5a	Filter Housings - EDG Control Panel Supply Ventilation	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B

Table 3.3.2-15 (Cont'd) Ventilation System - Diesel Generator Building: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Filter Housings - EDG Control Panel Supply Ventilation	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
6a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F4-6	3.3.1-11	E 305 316
6b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316

Table 3.3.2-16 Ventilation System – Auxiliary Feedwater Pumphouse: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F4-3	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
2b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
3a	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C
3b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
3c	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
3d	Ductwork & Fittings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4a	Fan Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
4b	Fan Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G

Table 3.3.2-17 Ventilation Systems – Miscellaneous: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.F4-3	3.3.1-55	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
2b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
3a	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
3b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	C
4a	Fan Housings	Pressure Boundary Missile Barrier	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B 312
4b	Fan Housings	Pressure Boundary Missile Barrier	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G 312
5a	Filter Housings - Tunnel Supply Air	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F3-2	3.3.1-56	B

Table 3.3.2-17 (Cont'd) Ventilation Systems – Miscellaneous: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Filter Housings - Tunnel Supply Air	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
6a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	VII.F4-6	3.3.1-11	E 305 316
6b	Flexible Connectors	Pressure Boundary	Elastomer	Air – Ventilation (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	G 305 316

Table 3.3.2-18 Ventilation Systems – Radwaste Buildings: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Damper Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F4-1	3.3.1-56	B
1b	Damper Housings	Pressure Boundary	Carbon Steel	Air – Ventilation (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
2a	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
2b	Ductwork & Fittings	Pressure Boundary	Galvanized steel	Air – Ventilation (Interior)	None	None Required	VII.J-6	3.3.1-92	B

Table 3.3.2-19 Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
1f	Closure Bolting	Pressure Boundary	Carbon Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25	3.3.1-19	D
1g	Closure Bolting	Pressure Boundary	Carbon Steel	Soil (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1h	Closure Bolting	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	E
1i	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2a	Fire Hydrants	Pressure Boundary	Cast Iron	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G
2b	Fire Hydrants	Pressure Boundary	Cast Iron	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
2c	Fire Hydrants	Pressure Boundary	Cast Iron	Concrete (Exterior)	None	None Required	VII.J-21	3.3.1-96	A
2d	Fire Hydrants	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
2e	Fire Hydrants	Pressure Boundary	Cast Iron (Gray Cast Iron)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-14	3.3.1-85	B
2f	Fire Hydrants	Pressure Boundary	Cast Iron	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25	3.3.1-19	B
2g	Fire Hydrants	Pressure Boundary	Cast Iron (Gray Cast Iron)	Soil (Exterior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-15	3.3.1-85	B
3a	Flame Arrestor Elements	Flame Arresting	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E 308
3b	Flame Arrestor Elements	Flame Arresting	Aluminum Alloy	Air – Outdoor (Interior)	Loss of Material	One–Time Inspection Program	None	None	J

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3c	Flame Arrestor Elements	Flame Arresting	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	J
3d	Flame Arrestor Elements	Flame Arresting	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	J
4a	Flame Arrestor Housings	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	J
4b	Flame Arrestor Housings	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E 308
4c	Flame Arrestor Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
4d	Flame Arrestor Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
4e	Flame Arrestor Housings	Pressure Boundary	Cast Iron	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
4f	Flame Arrestor Housings	Pressure Boundary	Cast Iron	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
4g	Flame Arrestor Housings	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	J
4h	Flame Arrestor Housings	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	J

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5a	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5b	Flexible Connectors	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Cracking	Piping and Duct Internal Inspection Program	VII.H2-1	3.3.1-6	E
5c	Flexible Connectors	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
5d	Flexible Connectors	Pressure Boundary	Stainless Steel	Raw Water – Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B
6a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	Loss of Material	None Required	None	None	G
6b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Copper Alloy (Zn > 15%)	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-12	3.3.1-88	A
6c	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6d	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Copper Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-12	3.3.1-70	B
6e	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Copper Alloy (Zn > 15%)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-13	3.3.1-84	B
6f	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
6g	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6h	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Fusible Links & Sprinkler Head Bulbs	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	C
7b	Fusible Links & Sprinkler Head Bulbs	Pressure Boundary	Glass	Air – Indoor (Exterior)	None	None Required	VII.J-8	3.3.1-93	C
7c	Fusible Links & Sprinkler Head Bulbs	Pressure Boundary	Lead alloy	Air – Indoor (Exterior)	None	None Required	None	None	F
8a	Hose Station Nozzles and Hose Connections	Pressure Boundary	Aluminum Alloy	Air – Indoor (Interior)	None	None Required	V.F-2	3.2.1-50	A
8b	Hose Station Nozzles and Hose Connections	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	A
8c	Hose Station Nozzles and Hose Connections	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	V.F-2	3.2.1-50	A
8d	Hose Station Nozzles and Hose Connections	Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	None	None Required	None	None	G

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8e	Hose Station Nozzles and Hose Connections	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A
9a	Hose Stations	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
9b	Hose Stations	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
9c	Hose Stations	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
9d	Hose Stations	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
9e	Hose Stations	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
9f	Hose Stations	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
9g	Hose Stations	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9h	Hose Stations	Pressure Boundary	Copper Alloy	Raw Water – Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-12	3.3.1-70	B
9i	Hose Stations	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
9j	Hose Stations	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
10a	Piping Components	Pressure Boundary	Aluminum Alloy	Air – Indoor (Interior)	None	None Required	V.F-2	3.2.1-50	A
10b	Piping Components	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	A
10c	Piping Components	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	V.F-2	3.2.1-50	A
10d	Piping Components	Pressure Boundary	Aluminum (Al Alloy > 6% Mg)	Raw Water - Well Water (Interior)	Cracking	Fire Protection Program	None	None	H
10e	Piping Components	Pressure Boundary	Aluminum Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-8	3.3.1-62	B

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
10g	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
10h	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
10i	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
10j	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
10k	Piping Components	Pressure Boundary	Carbon Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
10l	Piping Components	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-21	3.3.1-64	E

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10m	Piping Components	Pressure Boundary	Carbon Steel	Fuel Oil (Exterior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-21	3.3.1-64	E
10n	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
10o	Piping Components	Pressure Boundary	Carbon Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25	3.3.1-19	B
10p	Piping Components	Pressure Boundary	Cast Iron	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
10q	Piping Components	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
10r	Piping Components	Pressure Boundary	Cast Iron (Gray Cast Iron)	Air – Indoor (Exterior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	G
10s	Piping Components	Pressure Boundary	Cast Iron	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
10t	Piping Components	Pressure Boundary	Cast Iron	Concrete (Exterior)	None	None Required	VII.J-21	3.3.1-96	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10u	Piping Components	Pressure Boundary	Cast Iron	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-21	3.3.1-64	E
10v	Piping Components	Pressure Boundary	Cast Iron (Gray Cast Iron)	Fuel Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	H
10w	Piping Components	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
10x	Piping Components	Pressure Boundary	Cast Iron (Gray Cast Iron)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-14	3.3.1-85	B
10y	Piping Components	Pressure Boundary	Cast Iron	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25	3.3.1-19	B
10z	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	None	None Required	None	None	G
10aa	Piping Components	Pressure Boundary	Copper Alloy (Zn > 15%)	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-12	3.3.1-88	A

Table 3.3.2-19 (Cont'd)   Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10ab	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A
10ac	Piping Components	Pressure Boundary	Copper Alloy	Air – Outdoor (Exterior)	None	None Required	None	None	G
10ad	Piping Components	Pressure Boundary	Copper Alloy	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.G-10	3.3.1-32	E
10ae	Piping Components	Pressure Boundary	Copper Alloy (Zn > 15%)	Fuel Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	H
10af	Piping Components	Pressure Boundary	Copper Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-12	3.3.1-70	B
10ag	Piping Components	Pressure Boundary	Copper Alloy (Zn > 15%)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-13	3.3.1-84	B
10ah	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Interior)	None	None Required	VII.J-6	3.3.1-92	A
10ai	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10aj	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
10ak	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
10al	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
10am	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B
11a	Pump Casings - Fire Pumps (diesel-driven, motor-driven, and jockey pumps)	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
11b	Pump Casings - Fire Pumps (diesel-driven, motor-driven, and jockey pumps)	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
12a	Sight Glasses	Pressure Boundary	Glass	Air – Indoor (Exterior)	None	None Required	VII.J-8	3.3.1-93	A
12b	Sight Glasses	Pressure Boundary	Glass	Raw Water - Well Water (Interior)	None	None Required	VII.J-11	3.3.1-93	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13a	Silencers	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
13b	Silencers	Pressure Boundary	Carbon Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
13c	Silencers	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	J
13d	Silencers	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Cracking	Piping and Duct Internal Inspection Program	VII.H2-1	3.3.1-6	E
13e	Silencers	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
14a	Spray Shields	Flow Direction	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
14b	Spray Shields	Flow Direction	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
14c	Spray Shields	Flow Direction	Copper Alloy (Zn > 15%)	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-12	3.3.1-88	C

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14d	Spray Shields	Flow Direction	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	C
14e	Spray Shields	Flow Direction	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
14f	Spray Shields	Flow Direction	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	C
14g	Spray Shields	Flow Direction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	C
15a	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Aluminum Alloy	Air – Indoor (Interior)	None	None Required	V.F-2	3.2.1-50	A
15b	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	A
15c	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	V.F-2	3.2.1-50	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15d	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
15e	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
15f	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
15g	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
15h	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	None	None Required	None	None	G

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15i	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Copper Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-12	3.3.1-70	B
15j	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Copper Alloy (Zn > 15%)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-13	3.3.1-84	B
15k	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Copper Alloy (Zn > 15%)	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-12	3.3.1-88	A
15l	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A
15m	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15n	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Stainless Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B
15o	Sprinkler Heads and Spray Nozzles	Flow distribution Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
16a	Strainer Elements	Debris Protection	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
16b	Strainer Elements	Debris Protection	Stainless Steel	Raw Water - Well Water (Exterior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B
17a	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
17b	Strainer Housings	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
17c	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
17d	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
17e	Strainer Housings	Pressure Boundary	Cast Iron	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
17f	Strainer Housings	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
17g	Strainer Housings	Pressure Boundary	Cast Iron (Gray Cast Iron)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-14	3.3.1-85	B
17h	Strainer Housings	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
17i	Strainer Housings	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
18a	Tanks - F.O. Storage Tanks (Fire Pump Diesel)	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18b	Tanks - F.O. Storage Tanks (Fire Pump Diesel)	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program One-Time Inspection Program	VII.G-21	3.3.1-64	E
18c	Tanks - F.O. Storage Tanks (Fire Pump Diesel)	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
19a	Tanks - FP Water Storage Tanks	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
19b	Tanks - FP Water Storage Tanks	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	D
19c	Tanks - FP Water Storage Tanks	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
20a	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Indoor (Interior)	None	None Required	V.F-2	3.2.1-50	A
20b	Valve Bodies	Pressure Boundary	Aluminum Alloy	Halon (Interior)	None	None Required	None	None	G 307

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20c	Valve Bodies	Pressure Boundary	Aluminum Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-8	3.3.1-62	B
20d	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	A
20e	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	V.F-2	3.2.1-50	A
20f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
20g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
20h	Valve Bodies	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-21	3.3.1-64	E
20i	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
20j	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.D-3	3.3.1-57	B

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20k	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
20l	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
20m	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
20n	Valve Bodies	Pressure Boundary	Cast Iron	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-21	3.3.1-64	E
20o	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Fuel Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	H
20p	Valve Bodies	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-24	3.3.1-68	B
20q	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-14	3.3.1-85	B
20r	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.D-3	3.3.1-57	B

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20s	Valve Bodies	Pressure Boundary	Cast Iron	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
20t	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Air – Outdoor (Exterior) (Wetted)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	G
20u	Valve Bodies	Pressure Boundary	Cast Iron	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.G-25	3.3.1-19	B
20v	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Soil (Exterior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.G-15	3.3.1-85	B
20w	Valve Bodies	Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	None	None Required	None	None	G
20x	Valve Bodies	Pressure Boundary	Copper Alloy	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.G-10	3.3.1-32	E
20y	Valve Bodies	Pressure Boundary	Copper Alloy	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-12	3.3.1-70	B
20z	Valve Bodies	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A

Table 3.3.2-19 (Cont'd) Fire Protection Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20aa	Valve Bodies	Pressure Boundary	Copper Alloy	Air – Outdoor (Exterior)	None	None Required	None	None	G
20ab	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - Well Water (Interior)	Loss of Material	Fire Protection Program	VII.G-19	3.3.1-69	B
20ac	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
20ad	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.3.2-20 Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Air Receivers	Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	C
1b	Air Receivers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
2d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
3a	Collection Troughs (EDG Lube Oil Leakage)	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	D
3b	Collection Troughs (EDG Lube Oil Leakage)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Eductors - EDG F.O. Ejector Ass'y	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
4b	Eductors - EDG F.O. Ejector Ass'y	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4c	Eductors - EDG F.O. Ejector Ass'y	Pressure Boundary	Copper Alloy	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H2-9	3.3.1-32	E
4d	Eductors - EDG F.O. Ejector Ass'y	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
5a	Electric Heater Housings	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	D
5b	Electric Heater Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-20	3.3.1-14	B
5c	Electric Heater Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5d	Electric Heater Housings	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
5e	Electric Heater Housings	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-17	3.3.1-33	B
5f	Electric Heater Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6a	Filter Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
6b	Filter Housings	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
6c	Filter Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
6d	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
6e	Filter Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	D

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Flame Arrestor Elements	Flame Arresting	Aluminum Alloy	Air – Outdoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	J
7b	Flame Arrestor Elements	Flame Arresting	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E 308
7c	Flame Arrestor Elements	Flame Arresting	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	J
7d	Flame Arrestor Elements	Flame Arresting	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	J
8a	Flame Arrestor Housings	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
8b	Flame Arrestor Housings	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E 308
8c	Flame Arrestor Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
8d	Flame Arrestor Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
9a	Flexible Connectors	Pressure Boundary	Elastomer	Air – Outdoor (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	VII.F2-7	3.3.1-11	E 305

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9b	Flexible Connectors	Pressure Boundary	Elastomer	Diesel Exhaust (Interior)	Change in Material Properties	Piping and Duct Internal Inspection Program	None	None	J 316
9c	Flexible Connectors	Pressure Boundary	Elastomer	Air – Outdoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	G
9d	Flexible Connectors	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Cracking	Piping and Duct Internal Inspection Program	VII.H2-1	3.3.1-6	E
9e	Flexible Connectors	Pressure Boundary	Stainless Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
9f	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
9g	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
10a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
10c	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
10d	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
10e	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
10f	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10g	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-17	3.3.1-33	B
10h	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
11a	Heat Exchangers - EDG Jacket Water HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B
11b	Heat Exchangers - EDG Jacket Water HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.H2-4	3.3.1-59	B
12a	Heat Exchangers - EDG Jacket Water HXs (Shells)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
12b	Heat Exchangers - EDG Jacket Water HXs (Shells)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12c	Heat Exchangers - EDG Jacket Water HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.H2-4	3.3.1-59	B
13a	Heat Exchangers - EDG Jacket Water HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
13b	Heat Exchangers - EDG Jacket Water HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B
13c	Heat Exchangers - EDG Jacket Water HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
13d	Heat Exchangers - EDG Jacket Water HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.C2-2	3.3.1-52	B
14a	Heat Exchangers - EDG Jacket Water HXs (Tubesheets)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14b	Heat Exchangers - EDG Jacket Water HXs (Tubesheets)	Pressure Boundary	Copper Alloy (Zn>15%)	Closed-Cycle Cooling Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	V.A-6	3.2.1-41	B
14c	Heat Exchangers - EDG Jacket Water HXs (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water - NSCW (Exterior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
14d	Heat Exchangers - EDG Jacket Water HXs (Tubesheets)	Pressure Boundary	Copper Alloy (Zn > 15%)	Raw Water - NSCW (Exterior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.C1-4	3.3.1-84	B
15a	Heat Exchangers - EDG Lube Oil HXs (Channel Heads)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
15b	Heat Exchangers - EDG Lube Oil HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
15c	Heat Exchangers - EDG Lube Oil HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	D

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
16a	Heat Exchangers - EDG Lube Oil HXs (Shells)	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-5	3.3.1-21	B
16b	Heat Exchangers - EDG Lube Oil HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	D
17a	Heat Exchangers - EDG Lube Oil HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
17b	Heat Exchangers - EDG Lube Oil HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.C2-2	3.3.1-52	B
17c	Heat Exchangers - EDG Lube Oil HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-8	3.3.1-26	D
17d	Heat Exchangers - EDG Lube Oil HXs (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Lube Oil (Exterior)	Reduction of Heat Transfer	Oil Analysis Program One-Time Inspection Program	V.A-12	3.2.1-9	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Heat Exchangers - EDG Lube Oil HXs (Tubesheets)	Pressure Boundary	Copper Alloy	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-8	3.3.1-26	D
18b	Heat Exchangers - EDG Lube Oil HXs (Tubesheets)	Pressure Boundary	Copper Alloy (Zn> 15%)	Lube Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	H
18c	Heat Exchangers - EDG Lube Oil HXs (Tubesheets)	Pressure Boundary	Copper Alloy (Zn > 15%)	Closed-Cycle Cooling Water (Exterior)	Cracking	Closed Cooling Water Program	None	None	H
18d	Heat Exchangers - EDG Lube Oil HXs (Tubesheets)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
19a	Oil Reservoirs - EDG Lube Oil Sumps	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
19b	Oil Reservoirs - EDG Lube Oil Sumps	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	D

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
19c	Oil Reservoirs - EDG Lube Oil Sumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
20a	Piping Components	Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
20b	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
20c	Piping Components	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
20d	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
20e	Piping Components	Pressure Boundary	Carbon Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
20f	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20g	Piping Components	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
20h	Piping Components	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
20i	Piping Components	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-19	3.3.1-76	B
20j	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
20k	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
20l	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-09	3.3.1-58	B
20m	Piping Components	Pressure Boundary	Carbon Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.C1-18	3.3.1-19	B
20n	Piping Components	Pressure Boundary	Stainless Steel	Air - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
20o	Piping Components	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
20p	Piping Components	Pressure Boundary	Stainless Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E
20q	Piping Components	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-17	3.3.1-33	B
20r	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-15	3.3.1-79	B
20s	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
20t	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
20u	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
21a	Pump Casings - EDG F.O. Engine-Driven Pumps	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
21b	Pump Casings - EDG F.O. Engine-Driven Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
22a	Pump Casings - EDG F.O. Storage Tank Pumps	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
22b	Pump Casings - EDG F.O. Storage Tank Pumps	Pressure Boundary	Carbon Steel	Fuel Oil (Exterior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
22c	Pump Casings - EDG F.O. Storage Tank Pumps	Pressure Boundary	Stainless Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
22d	Pump Casings - EDG F.O. Storage Tank Pumps	Pressure Boundary	Stainless Steel	Fuel Oil (Exterior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E
23a	Pump Casings - EDG Jacket Water Chem Add'n Pumps	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
23b	Pump Casings - EDG Jacket Water Chem Add'n Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
24a	Pump Casings - EDG Jacket Water Keep Warm Pumps	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
24b	Pump Casings - EDG Jacket Water Keep Warm Pumps	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
24c	Pump Casings - EDG Jacket Water Keep Warm Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
25a	Pump Casings - EDG Jacket Water Pumps	Pressure Boundary	Cast Iron	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
25b	Pump Casings - EDG Jacket Water Pumps	Pressure Boundary	Cast Iron (Gray Cast Iron)	Closed-Cycle Cooling Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.C2-8	3.3.1-85	B
25c	Pump Casings - EDG Jacket Water Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
26a	Pump Casings - EDG Lube Oil Keep Warm Pumps	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
26b	Pump Casings - EDG Lube Oil Keep Warm Pumps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
27a	Pump Casings - EDG Lube Oil Pumps	Pressure Boundary	Cast Iron	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
27b	Pump Casings - EDG Lube Oil Pumps	Pressure Boundary	Cast Iron (Gray Cast Iron)	Lube Oil (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	None	None	H

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
27c	Pump Casings - EDG Lube Oil Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
28a	Silencers	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D
28b	Silencers	Pressure Boundary	Carbon Steel	Diesel Exhaust (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.H2-2	3.3.1-18	E
28c	Silencers	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
29a	Strainer Elements	Debris Protection	Carbon Steel	Fuel Oil (Exterior)	Loss of Material	Diesel Fuel Oil Program Fire Protection Program	VII.H1-10	3.3.1-20	E
29b	Strainer Elements	Debris Protection	Carbon Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-20	3.3.1-14	B
29c	Strainer Elements	Debris Protection	Stainless Steel	Fuel Oil (Exterior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
29d	Strainer Elements	Debris Protection	Stainless Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-17	3.3.1-33	B
30a	Strainer Housings	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
30b	Strainer Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
30c	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
30d	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
31a	Tanks - EDG F.O. Day Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
31b	Tanks - EDG F.O. Day Tanks	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
31c	Tanks - EDG F.O. Day Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
32a	Tanks - EDG F.O. Line Leakage Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
32b	Tanks - EDG F.O. Line Leakage Tanks	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
32c	Tanks - EDG F.O. Line Leakage Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
33a	Tanks - EDG F.O. Storage Tanks	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
33b	Tanks - EDG F.O. Storage Tanks	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program Periodic Surveillance and Preventive Maintenance Activities	VII.H1-10	3.3.1-20	E
33c	Tanks - EDG F.O. Storage Tanks	Pressure Boundary	Carbon Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VII.C1-18	3.3.1-19	D

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
34a	Tanks - EDG Jacket Water Chem Add Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
34b	Tanks - EDG Jacket Water Chem Add Tanks	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
34c	Tanks - EDG Jacket Water Chem Add Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
34d	Tanks - EDG Jacket Water Chem Add Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
35a	Valve Bodies	Pressure Boundary	Carbon Steel	Air - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
35b	Valve Bodies	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
35c	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
35d	Valve Bodies	Pressure Boundary	Carbon Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
35e	Valve Bodies	Pressure Boundary	Carbon Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-10	3.3.1-20	E
35f	Valve Bodies	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
35g	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-19	3.3.1-76	B
35h	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
35i	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
35j	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
35k	Valve Bodies	Pressure Boundary	Stainless Steel	Air - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
35l	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
35m	Valve Bodies	Pressure Boundary	Stainless Steel	Fuel Oil (Interior)	Loss of Material	Diesel Fuel Oil Program One-Time Inspection Program	VII.H1-6	3.3.1-32	E
35n	Valve Bodies	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.H2-17	3.3.1-33	B
35o	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-15	3.3.1-79	B
35p	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
35q	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-20 (Cont'd) Emergency Diesel Generator System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
35r	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
36	Vent Screens - Tank Vents	Debris Protection	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B

Table 3.3.2-21 Demineralized Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
2b	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3a	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
3b	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-21 (Cont'd) Demineralized Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
4b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5a	Pump Casings - Demin Wtr Transfer Booster Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
5b	Pump Casings - Demin Wtr Transfer Booster Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-21 (Cont'd) Demineralized Water System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6a	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
6b	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-22 Hydrogen Recombiner and Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Hydrogen Recombiner (CTMT) Housings	Flow Direction	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
2b	Hydrogen Recombiner (CTMT) Housings	Flow Direction	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
2c	Hydrogen Recombiner (CTMT) Housings	Flow Direction	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	J
2d	Hydrogen Recombiner (CTMT) Housings	Flow Direction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	C

Table 3.3.2-22 (Cont'd) Hydrogen Recombiner and Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	J
3b	Piping Components	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
3c	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4a	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	J
4b	Valve Bodies	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
4c	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-23 Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Condensation)	Loss of Material	Bolting Integrity Program	VII.D-1	3.3.1-44	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
1f	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
1g	Closure Bolting	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	F
1h	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Drain Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	J

Table 3.3.2-23 (Cont'd) Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2b	Drain Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Interior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
2c	Drain Bodies	Pressure Boundary	Cast Iron	Concrete (Exterior)	None	None Required	VII.J-21	3.3.1-96	A
3a	Floor Drain Plugs	Pressure Boundary	Lead alloy	Air – Indoor (Interior)	None	None Required	None	None	F
3b	Floor Drain Plugs	Pressure Boundary	Lead alloy	Air – Indoor (Exterior)	None	One-Time Inspection Program	None	None	F 311
4a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
4b	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
4c	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
4d	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
4e	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-23 (Cont'd) Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
4g	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Wetted)	Loss of Material	External Surfaces Monitoring Program	None	None	G
4h	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
4i	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
4j	Piping Components	Pressure Boundary	Cast Iron	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
4k	Piping Components	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4l	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Interior)	None	None Required	None	None	G
4m	Piping Components	Pressure Boundary	Copper Alloy	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
4n	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-2	3.4.1-41	A

Table 3.3.2-23 (Cont'd) Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4o	Piping Components	Pressure Boundary	PVC	Air – Indoor (Interior)	None	None Required	None	None	F
4p	Piping Components	Pressure Boundary	PVC	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	F 303
4q	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
4r	Piping Components	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
4s	Piping Components	Pressure Boundary	Stainless Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
4t	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4u	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	VII.J-17	3.3.1-96	A
4v	Piping Components	Pressure Boundary	Stainless Steel	Drainage - Dirty (Exterior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
5a	Pump Casings - CCW Drain Tank Pumps	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B

Table 3.3.2-23 (Cont'd) Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Pump Casings - CCW Drain Tank Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6a	Tanks - Acid Neutralizing Sumps	Pressure Boundary	Polypropylene	Air – Indoor (Interior)	None	None Required	None	None	F
6b	Tanks - Acid Neutralizing Sumps	Pressure Boundary	Polypropylene	Air – Indoor (Exterior)	Change in Material Properties	External Surfaces Monitoring Program	None	None	F 303
7a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
7b	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
7c	Valve Bodies	Pressure Boundary	Carbon Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
7d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
7e	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-23 (Cont'd) Drain Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B
7g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (Condensation)	Loss of Material	External Surfaces Monitoring Program	VII.I-11	3.3.1-58	B
7h	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
7i	Valve Bodies	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
7j	Valve Bodies	Pressure Boundary	Stainless Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
7k	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-24 Potable and Utility Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Arrestors (Water Hammer)	Pressure Boundary	Copper Alloy	Domestic Water (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
1b	Arrestors (Water Hammer)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
2c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2d	Closure Bolting	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	F
3a	Piping Components	Pressure Boundary	Copper Alloy	Domestic Water (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
3b	Piping Components	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
3c	Piping Components	Pressure Boundary	Galvanized Steel	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-24 (Cont'd) Potable and Utility Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3d	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
3e	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
4a	Pump Casings - Hot Water Recirculation Pumps	Pressure Boundary	Copper Alloy	Domestic Water (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
4b	Pump Casings - Hot Water Recirculation Pumps	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
5a	Strainer Housings	Pressure Boundary	Copper Alloy	Domestic Water (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
5b	Strainer Housings	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
6a	Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
6b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-24 (Cont'd) Potable and Utility Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
6d	Valve Bodies	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E
6e	Valve Bodies	Pressure Boundary	Cast Iron (Gray Cast Iron)	Raw Water - Well Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VIII.A-7	3.4.1-36	B
6f	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
6g	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
6h	Valve Bodies	Pressure Boundary	Copper Alloy	Domestic Water (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
6i	Valve Bodies	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A

Table 3.3.2-24 (Cont'd) Potable and Utility Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Water Heater Housings and Jackets	Pressure Boundary Flow Direction	Carbon Steel	Domestic Water (Interior)	Loss of Material	Periodic Surveillance and Preventive Maintenance Activities	None	None	J 314
7b	Water Heater Housings and Jackets	Pressure Boundary Flow Direction	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-25 Radiation Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
2b	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
2c	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
2d	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	Flow-Accelerated Corrosion Program	None	None	G 310

Table 3.3.2-25 (Cont'd) Radiation Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2e	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A
2f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
2g	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
2h	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
2i	Piping Components	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
2j	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
2k	Piping Components	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
2l	Piping Components	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-15	3.3.1-79	B
2m	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-25 (Cont'd) Radiation Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2n	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
3a	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior) (ACCW Sys.)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
3b	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
3c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
3d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
3e	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
3f	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Ventilation (Interior)	None	None Required	None	None	H
3g	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
3h	Valve Bodies	Pressure Boundary	Stainless Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-15	3.3.1-79	B

Table 3.3.2-25 (Cont'd) Radiation Monitoring System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3i	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-26 Reactor Makeup Water Storage System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-1	3.3.1-43	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 309
1f	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1g	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A

Table 3.3.2-26 (Cont'd) Reactor Makeup Water Storage System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3a	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B 318
3b	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-9	3.3.1-58	B 317
3c	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
3d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3e	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
3f	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	VII.J-17	3.3.1-96	A

Table 3.3.2-26 (Cont'd) Reactor Makeup Water Storage System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
4b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5a	Pump Casings - Rx Make-up Wtr Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
5b	Pump Casings - Rx Make-up Wtr Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6a	Tank Diaphragms - RMWSTs	Physical Integrity	Elastomer	Treated Water (Interior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	None	None	G 303
6b	Tank Diaphragms - RMWSTs	Physical Integrity	Elastomer	Air – Outdoor (Exterior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	None	None	G 303

Table 3.3.2-26 (Cont'd) Reactor Makeup Water Storage System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Tank Liners (& internals) - RMWST Liners	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G
7b	Tank Liners (& internals) - RMWST Liners	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.E-40	3.4.1-6	A
7c	Tank Liners (& internals) - RMWST Liners	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	VII.J-17	3.3.1-96	C
8a	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
8b	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
8c	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.3.2-27 Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	C
1b	Closure Bolting	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	F
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1f	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Corrosion Product Monitors (Shells and Heads)	Pressure Boundary	Copper Alloy	Air – Indoor (Exterior)	None	None Required	V.F-3	3.2.1-53	A
2b	Corrosion Product Monitors (Shells and Heads)	Pressure Boundary	Copper Alloy	Raw Water - River Water (Interior)	Loss of Material	Periodic Surveillance and Preventive Maintenance Activities	VII.C1-3	3.3.1-82	E

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Filter Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3b	Filter Housings	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	C
4a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
4b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
4c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	C
5a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5c	Piping Components	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
5d	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
5e	Piping Components	Pressure Boundary	Carbon Steel	Gas - Miscellaneous (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
5f	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	III.B1.1-8	3.5.1-55	C 308
5g	Piping Components	Pressure Boundary	Galvanized Steel	Air – Indoor (Exterior)	None	None Required	VII.J-6	3.3.1-92	A
5h	Piping Components	Pressure Boundary	Galvanized Steel	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5i	Piping Components	Pressure Boundary	Galvanized Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	None	None	G
5j	Piping Components	Pressure Boundary	Ni Alloy	Air – Indoor (Exterior)	None	None Required	VII.J-14	3.3.1-94	A
5k	Piping Components	Pressure Boundary	Ni Alloy	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	IV.C2-13	3.1.1-31	E
5l	Piping Components	Pressure Boundary	Ni Alloy	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	IV.C2-15	3.1.1-83	C
5m	Piping Components	Pressure Boundary	Ni Alloy	Steam (Interior)	Cracking	Water Chemistry Control Program	None	None	H
5n	Piping Components	Pressure Boundary	Ni Alloy	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-1	3.4.1-37	A
5o	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5p	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-20	3.3.1-90	A 301

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5q	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
5r	Piping Components	Pressure Boundary	Stainless Steel	Gas - Miscellaneous (Interior)	None	None Required	None	None	G
5s	Piping Components	Pressure Boundary	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	A
5t	Piping Components	Pressure Boundary	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.A-12	3.4.1-37	A
5u	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.F-24	3.4.1-14	A
5v	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
6a	Pump Casings - SGBD Sample Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6b	Pump Casings - SGBD Sample Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
6c	Pump Casings - SGBD Sample Pumps	Pressure Boundary	Cast Iron	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A
7a	Rotameter Housings	Pressure Boundary	Glass	Air – Indoor (Exterior)	None	None Required	VII.J-8	3.3.1-93	A
7b	Rotameter Housings	Pressure Boundary	Glass	Treated Water (Interior)	None	None Required	VII.J-13	3.3.1-93	A
7c	Rotameter Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
7d	Rotameter Housings	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	C
8a	Sample Baths - Steam Generator Blowdown Bath (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8b	Sample Baths - Steam Generator Blowdown Bath (Shells)	Pressure Boundary	Stainless Steel	Raw Water - Well Water (Interior)	Loss of Material	Periodic Surveillance and Preventive Maintenance Activities	V.A-8	3.2.1-39	E
9a	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
9b	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
9c	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
9d	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9e	Sample Coolers - Primary and Secondary-Side Samples (Shells and End Plates)	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-28	3.4.1-3	A
10a	Strainer Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
10b	Strainer Housings	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	C
11a	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.A3-4	3.3.1-88	A
11b	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	V.F-2	3.2.1-50	A
11c	Valve Bodies	Pressure Boundary	Aluminum Alloy	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-1	3.4.1-15	A
11d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11e	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.I-10	3.4.1-41	A
11f	Valve Bodies	Pressure Boundary	Carbon Steel (ACCW Sys.)	Closed-Cycle Cooling Water (Interior)	Cracking	ACCW System Carbon Steel Components Program	None	None	H 306
11g	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
11h	Valve Bodies	Pressure Boundary	Carbon Steel	Gas - Miscellaneous (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
11i	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
11j	Valve Bodies	Pressure Boundary	Cast Iron	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
11k	Valve Bodies	Pressure Boundary	Cast Iron	Raw Water - Well Water (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VII.C1-19	3.3.1-76	E

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11l	Valve Bodies	Pressure Boundary	Cast Iron	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
11m	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
11n	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VII.E1-20	3.3.1-90	A 301
11o	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.E1-17	3.3.1-91	A
11p	Valve Bodies	Pressure Boundary	Stainless Steel	Gas - Miscellaneous (Interior)	None	None Required	None	None	G
11q	Valve Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	A
11r	Valve Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.A-12	3.4.1-37	A

Table 3.3.2-27 (Cont'd) Sampling Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11s	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140ºF)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.F-24	3.4.1-14	A
11t	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A

Table 3.3.2-28 Auxiliary Gas Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
1d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.D-3	3.3.1-57	B
2b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
2c	Piping Components	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
2d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
2e	Piping Components	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A

Table 3.3.2-28 (Cont'd) Auxiliary Gas Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.D-3	3.3.1-57	B
3b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
3c	Valve Bodies	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
3d	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
3e	Valve Bodies	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A

Table 3.3.2-29 Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Air Separator	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
1b	Air Separator	Pressure Boundary	Cast Iron	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	D
1c	Air Separator	Pressure Boundary	Cast Iron (Gray Cast Iron)	Closed-Cycle Cooling Water (Interior)	Loss of Material - Leaching	One-Time Inspection Program for Selective Leaching	VII.C2-8	3.3.1-85	D
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
2c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
3a	Electric Heater Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
3b	Electric Heater Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	D

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Essential Chillers - Condenser (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
4b	Essential Chillers - Condenser (Channel Heads)	Pressure Boundary	Carbon Steel	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-5	3.3.1-77	B
5a	Essential Chillers - Condenser (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
5b	Essential Chillers - Condenser (Shells)	Pressure Boundary	Carbon Steel	Freon (Interior)	None	None Required	None	None	G
6a	Essential Chillers - Condenser (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Freon (Exterior)	None	None Required	None	None	G
6b	Essential Chillers - Condenser (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	Essential Chillers - Condenser (Tubes)	Pressure Boundary Exchange Heat	Copper Alloy	Raw Water - NSCW (Interior)	Reduction of Heat Transfer	GL 89-13 Program	VII.C1-6	3.3.1-83	B
7a	Essential Chillers - Condenser (Tubesheets)	Pressure Boundary	Copper Alloy	Freon (Interior)	None	None Required	None	None	G
7b	Essential Chillers - Condenser (Tubesheets)	Pressure Boundary	Copper Alloy	Raw Water - NSCW (Exterior)	Loss of Material	GL 89-13 Program	VII.C1-3	3.3.1-82	B
8a	Essential Chillers - Evaporator (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
8b	Essential Chillers - Evaporator (Channel Heads)	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-1	3.3.1-48	B
9a	Essential Chillers - Evaporator (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.F1-10	3.3.1-59	B
9b	Essential Chillers - Evaporator (Shells)	Pressure Boundary	Carbon Steel	Freon (Interior)	None	None Required	None	None	G

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10a	Essential Chillers - Evaporator (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
10b	Essential Chillers - Evaporator (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Interior)	Reduction of Heat Transfer	Closed Cooling Water Program	VII.C2-2	3.3.1-52	B
10c	Essential Chillers - Evaporator (Tubes)	Exchange Heat Pressure Boundary	Copper Alloy	Freon (Exterior)	None	None Required	None	None	G
11a	Essential Chillers - Evaporator (Tubesheets)	Pressure Boundary	Copper Alloy	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.E1-2	3.3.1-51	B
11b	Essential Chillers - Evaporator (Tubesheets)	Pressure Boundary	Copper Alloy	Freon (Interior)	None	None Required	None	None	G
12a	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12b	Flow Orifice / Elements	Flow Restriction Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
13a	Oil Reservoirs - Chiller Compressors	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
13b	Oil Reservoirs - Chiller Compressors	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
13c	Oil Reservoirs - Chiller Compressors	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	D
14a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
14b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
14c	Piping Components	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
15b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
16a	Pump Casings - Chilled Water Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
16b	Pump Casings - Chilled Water Pumps	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
17a	Pump Casings - Chiller Motor Driven Oil Pumps	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B
17b	Pump Casings - Chiller Motor Driven Oil Pumps	Pressure Boundary	Carbon Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VII.C1-17	3.3.1-14	B

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Sight Glasses	Pressure Boundary	Glass	Air – Indoor (Exterior)	None	None Required	VII.J-8	3.3.1-93	A
18b	Sight Glasses	Pressure Boundary	Glass	Closed-Cycle Cooling Water (Interior)	None	None Required	None	None	G
19	Strainer Elements	Debris Protection	Stainless Steel	Closed-Cycle Cooling Water (Exterior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B
20a	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
20b	Strainer Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
20c	Strainer Housings	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
21a	Tanks - Chilled Water Chemical Feed Pots	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
21b	Tanks - Chilled Water Chemical Feed Pots	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
21c	Tanks - Chilled Water Chemical Feed Pots	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
22a	Tanks - Chilled Water Expansion Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
22b	Tanks - Chilled Water Expansion Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
22c	Tanks - Chilled Water Expansion Tanks	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
23a	Tanks - Chiller Economizers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
23b	Tanks - Chiller Economizers	Pressure Boundary	Carbon Steel	Freon (Interior)	None	None Required	None	None	G
24a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
24b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-29 (Cont'd) Chilled Water Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
24c	Valve Bodies	Pressure Boundary	Carbon Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-14	3.3.1-47	B
24d	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
24e	Valve Bodies	Pressure Boundary	Stainless Steel	Closed-Cycle Cooling Water (Interior)	Loss of Material	Closed Cooling Water Program	VII.C2-10	3.3.1-50	B

Table 3.3.2-30 Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Accumulators	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
1b	Accumulators	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
2a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VII.I-4	3.3.1-43	E
2b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-2	3.3.1-89	A
2c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VII.I-5	3.3.1-45	E
2d	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
3a	Equipment Frames - Catalytic H2 Recombiner Skid	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
3b	Equipment Frames - Catalytic H2 Recombiner Skid	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4a	Equipment Frames - Waste Gas Compressor Skid	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
4b	Equipment Frames - Waste Gas Compressor Skid	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
5a	Filter Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
5b	Filter Housings	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
5c	Filter Housings	Pressure Boundary	Stainless Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
6a	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
6b	Flow Orifice / Elements	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
7a	Gas Traps	Pressure Boundary	Carbon Steel	Air – Indoor (Interior) (Wetted)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	J
7b	Gas Traps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7c	Gas Traps	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
7d	Gas Traps	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	J
8a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
8b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
8c	Piping Components	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
8d	Piping Components	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
8e	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
8f	Piping Components	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
8g	Piping Components	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8h	Piping Components	Pressure Boundary	Stainless Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
8i	Piping Components	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A
9a	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
9b	Piping Components - Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	J
10a	Pump Casings - Gas Decay Drain Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
10b	Pump Casings - Gas Decay Drain Pumps	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
11a	Tanks - Backflushable Filter Crud Tanks	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11b	Tanks - Backflushable Filter Crud Tanks	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	C
11c	Tanks - Backflushable Filter Crud Tanks	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
12a	Tanks - Waste Gas Decay Shutdown Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
12b	Tanks - Waste Gas Decay Shutdown Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
12c	Tanks - Waste Gas Decay Shutdown Tanks	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
13a	Tanks - Waste Gas Decay Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
13b	Tanks - Waste Gas Decay Tanks	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13c	Tanks - Waste Gas Decay Tanks	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
14a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VII.I-8	3.3.1-58	B
14b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VII.I-10	3.3.1-89	A
14c	Valve Bodies	Pressure Boundary	Carbon Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
14d	Valve Bodies	Pressure Boundary	Carbon Steel	Gas - Dried (Interior)	None	None Required	VII.J-23	3.3.1-97	A
14e	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VII.J-15	3.3.1-94	A
14f	Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water (Interior)	Loss of Material	Water Chemistry Control Program	VII.A2-1	3.3.1-91	A
14g	Valve Bodies	Pressure Boundary	Stainless Steel	Drainage - Clean (Interior)	Loss of Material	One-Time Inspection Program	None	None	G
14h	Valve Bodies	Pressure Boundary	Stainless Steel	Drainage - Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G

Table 3.3.2-30 (Cont'd) Waste Management Systems: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
14i	Valve Bodies	Pressure Boundary	Stainless Steel	Gas - Dried (Interior)	None	None Required	VII.J-19	3.3.1-97	A

Table 3.3.2-31 Thermal Insulation: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Insulation - Jacketing and Supports	Structural Support Shelter / Protection	Aluminum Alloy	Exposed to weather (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-07	3.5.1-50	E 308
1b	Insulation - Jacketing and Supports	Structural Support Shelter / Protection	Aluminum Alloy	Protected from weather (Exterior)	None	None Required	V.F-2	3.2.1-50	C
1c	Insulation - Jacketing and Supports	Structural Support Shelter / Protection	Stainless Steel	Exposed to weather (Exterior)	None	None Required	None	None	G
1d	Insulation - Jacketing and Supports	Structural Support Shelter / Protection	Stainless Steel	Protected from weather (Exterior)	None	None Required	VII.J-15	3.3.1-94	C
2a	Thermal Insulation	Environmental Control Physical Integrity	Fibers, Foams, Ceramics	Protected from weather	None	None Required	None	None	J

Table 3.3.2-31 (Cont'd) Thermal Insulation: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2b	Thermal Insulation	Environmental Control Physical Integrity	Stainless Steel	Protected from weather	None	None Required	V.F-12	3.2.1-53	C

Table 3.3.2-32 Miscellaneous Leak Detection System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	V.E-4	3.2.1-23	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-2	3.2.1-45	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	V.E-5	3.2.1-24	E
2a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
2b	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
2c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A
2d	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Interior)	None	None Required	None	None	G
2e	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	V.F-12	3.2.1-53	A
3a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E

Table 3.3.2-32(cont'd) Miscellaneous Leak Detection System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3b	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	V.E-7	3.2.1-31	B
3c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	V.E-9	3.2.1-45	A

Standard Notes for Auxiliary Systems

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.

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

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

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

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

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

Plant Specific Notes for Auxiliary Systems

301. The associated NUREG-1801 Vol. 2 item includes only the Water Chemistry Program. The VEGP aging management strategy includes an additional confirmatory one-time inspection to verify program effectiveness.

302. The associated NUREG-1801 Vol. 2 item recommends a plant-specific program. The VEGP Buried Piping and Tanks Inspection Program will include stainless steel components exposed to a soil environment.

303. VEGP defines Change in Material Properties to include cracking resulting from changes in properties.

304. The VEGP aging effect is consistent with NUREG-1801 but the VEGP AMR results do not include wear as an applicable aging mechanism for this component. However, visual inspections performed as a part of the Overhead and Refueling Crane Inspection Program are adequate to detect loss of material, whether due to corrosion or due to wear.

305. NUREG-1801 Vol. 2 item lists the aging mechanism as “hardening and loss of strength/ elastomer degradation.” This mechanism is included within the VEGP aging effect Change in Material Properties – Elastomer Degradation. The VEGP aging effect also includes cracking resulting from elastomer degradation.

306. This result is based on VEGP ACCW system operating experience.

307. Consistent with NUREG-1801 V2 Sections IX and XI, VEGP includes management of Halon system components with the Fire Protection Program, even though no aging effects requiring management were identified.

308. A NUREG-1801 Vol. 2 Structural item is cited. A comparable item was not identified in NUREG-1801 Vol. 2 Sections V, VII, and VIII.

309. Loss of preload is conservatively considered to be applicable for all closure bolting. NUREG-1801 only addresses loss of preload for bolting in an air – indoor environment.

310. VEGP operating experience indicates the presence of aggressive chemistry (acidic) conditions downstream of the SGBD demineralizers. The original carbon steel piping materials have experienced wall thinning due to chemical attack. Inspections to detect wall thinning due to chemical attack are included in the scope of the FAC Program because the inspection methods used are similar to the inspection methods used to detect wall thinning due to FAC.

311. The drain plug material is assumed to be lead alloy. A one-time inspection is credited to confirm the material assumption and to verify that no significant aging has occurred.

312. The following fan housings, filter unit fan housing, and cooling unit housings are in scope for 54.4 (a)(2) missile barrier:

Fan Housings:

1(2)1503B7001-8 & 10	1(2)1505B7001-2	1(2)1506B7001-2
1(2)1511B7001-2	1(2)1512B7001-4	A1535B7001-2
1(2)1556B7003-10 & 12		

Filter Unit Fan Housings:

1(2)1504N7001-2	A1535N7001	A1541N7001-2
1(2)1553N7001-3		

Cooling Unit Housings:

1(2)1515A7001-2	A1533A7002	A1541A7005
1(2)1551A7003-4	A1551A7001	A1551E7001

313. Although NUREG-1801 a "Reduction of neutron-absorbing capacity" aging effect for Boral (GALL Item VII.A2-5), the VEGP AMR determined that reduction of neutron absorbing capacity is not an aging effect requiring management. Loss of material is managed by the Water Chemistry Control Program.

314. A periodic inspection will be implemented to monitor for evidence of leakage from the housing. The jacket functions as a spray shield and will be monitored by the External Surfaces Monitoring Program.

315. These components are located in the NSCW cooling tower basin and splash ring areas. Components located in these areas are considered to be exposed to a wetted environment.

316. This AMR line item addresses fiberglass reinforced elastomer material. There are no aging effects for the fiberglass reinforcement.

317. This AMR line item represents the exterior of the Reactor Makeup Water Storage Tank vent nozzle shrouds. These components are not subject to borated water leakage because there is no source that can leak onto the shrouds.

318. This AMR line item represents the interior of the Reactor Makeup Water Storage Tank vent nozzle shrouds.

319. This item represents bolting for the for the NSCW pump and transfer pump submerged pump columns. These fasteners are exposed to a "Raw Water - Nuclear Service Cooling Water" environment.

320. The CTB Cavity Cooling (1/2-1511-E7001-2) and CTB Aux Cooling (1/2-1515-A7001-2) unit coils are only required to perform a "pressure boundary" function. These cooling coils are not required to perform a "heat exchange" function.

321. Erosion of the letdown orifice and associated downstream piping components is based on VEGP operating experience

3.4 AGING MANAGEMENT OF STEAM AND POWER CONVERSION SYSTEMS

3.4.1 INTRODUCTION

This section provides the results of the aging management review of the steam and power conversion systems identified in Table 2.3.4.1 through 2.3.4.5. The following VEGP systems are addressed in this system group (with the applicable Section 2 reference in parentheses):

- Main Steam System (Section 2.3.4.1)
- Feedwater System (Section 2.3.4.2)
- Steam Generator Blowdown Processing System (Section 2.3.4.3)
- Auxiliary Feedwater System (Section 2.3.4.4)
- Auxiliary Steam System (Section 2.3.4.5)

Table 3.4.1, Summary of Aging Management Reviews for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801, provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for the steam and power conversion systems component groups that are relied on for license renewal. Text addressing summary items requiring further evaluation is provided in Section 3.4.2.2.

The format and usage of this Table and the associated further evaluation text is described in Section 3.0.2.

3.4.2 RESULTS

The following tables summarize the results of the aging management reviews for systems in the steam and power conversion systems group:

Table 3.4.2-1	Main Steam System – Summary of Aging Management Review
Table 3.4.2-2	Feedwater System – Summary of Aging Management Review
Table 3.4.2-3	Steam Generator Blowdown Processing System – Summary of Aging Management Review
Table 3.4.2-4	Auxiliary Feedwater System – Summary of Aging Management Review
Table 3.4.2-5	Auxiliary Steam System – Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the steam and power conversion systems in the following Sections:

- Main Steam System (Section 3.4.2.1.1)
- Feedwater System (Section 3.4.2.1.2)
- Steam Generator Blowdown Processing System (Section 3.4.2.1.3)
- Auxiliary Feedwater System (Section 3.4.2.1.4)
- Auxiliary Steam System (Section 3.4.2.1.5)

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

3.4.2.1.1 *Main Steam System Aging Management Review Results*

Materials

The materials of construction for the Main Steam System components requiring an aging management review are:

- Aluminum Alloy
- Carbon Steel
- Nickel Alloy
- Stainless Steel

Environments

Components of the Main Steam System are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Gas – Dried
- Hydraulic Fluid
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Main Steam System components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Flow Accelerated Corrosion (FAC)
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Main Steam System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- Oil Analysis Program (Appendix B.3.16)
- One-Time Inspection Program (Appendix B.3.17)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.4.2.1.2 *Feedwater System Aging Management Review Results*

Materials

The materials of construction for Feedwater System components requiring an aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Feedwater System are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Soil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Feedwater System components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Flow Accelerated Corrosion (FAC)
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Feedwater System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Buried Piping and Tanks Inspection Program (Appendix B.3.4)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- One-Time Inspection Program (Appendix B.3.17)
- Water Chemistry Control Program (Appendix B.3.28)

3.4.2.1.3 *Steam Generator Blowdown Processing System Aging Management Review Results*

Materials

The materials of construction for the Steam Generator Blowdown Processing System components requiring an aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Steam Generator Blowdown Processing System are exposed to the following environments:

- Air – Indoor
- Gas – Dried
- Raw Water – River Water
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Steam Generator Blowdown Processing System components require management:

- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Flow Accelerated Corrosion (FAC)
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Steam Generator Blowdown Processing System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- One-Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Water Chemistry Control Program (Appendix B.3.28)

3.4.2.1.4 *Auxiliary Feedwater System Aging Management Review Results*

Materials

The materials of construction for the Auxiliary Feedwater System components requiring an aging management review are:

- Aluminum Alloy
- Carbon Steel
- Cast Iron
- Elastomer
- Stainless Steel

Environments

Components of the Auxiliary Feedwater System are exposed to the following environments:

- Air – Indoor
- Air – Outdoor
- Concrete
- Drainage - Dirty
- Lube Oil
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Auxiliary Feedwater System components require management:

- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Flow Accelerated Corrosion (FAC)
- Loss of Preload
- Reduction of Heat Transfer

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Feedwater System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- Oil Analysis Program (Appendix B.3.16)
- One–Time Inspection Program (Appendix B.3.17)
- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Piping and Duct Internal Inspection Program (Appendix B.3.22)
- Water Chemistry Control Program (Appendix B.3.28)

3.4.2.1.5 *Auxiliary Steam System Aging Management Review Results*

Materials

The materials of construction for the Auxiliary Steam System components requiring an aging management review are:

- Carbon Steel
- Stainless Steel

Environments

Components of the Auxiliary Steam System are exposed to the following environments:

- Air – Indoor
- Air - Outdoor
- Steam
- Treated Water

Aging Effects Requiring Management

The following aging effects associated with Auxiliary Steam System components require management:

- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Material – Flow Accelerated Corrosion (FAC)
- Loss of Preload

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Steam System components:

- Bolting Integrity Program (Appendix B.3.2)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- External Surfaces Monitoring Program (Appendix B.3.8)
- Flow Accelerated Corrosion Program (Appendix B.3.10)
- One-Time Inspection Program (Appendix B.3.17)
- Water Chemistry Control Program (Appendix B.3.28)

3.4.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Steam and Power Conversion Systems

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.4.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.4.2.2.1 *Cumulative Fatigue Damage*

Fatigue is a time-limited aging analysis (TLAA) as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed separately in Section 4.3.2 of this application.

3.4.2.2.2 *Loss of Material due to General, Pitting, and Crevice Corrosion*

(1) Steel components exposed to treated water

NUREG-1800 item 3.4.2.2.2 (1) relates to steel piping and components, tanks, and heat exchangers exposed to treated water and steel piping and components exposed to steam. A one-time inspection is recommended to verify the effectiveness of the water chemistry control program.

Consistent with NUREG-1800, VEGP will manage loss of material due to general, pitting and crevice corrosion for carbon steel components exposed to treated water with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17).

(2) Steel components exposed to lubricating oil

NUREG-1800 item 3.4.2.2.2 (2) relates to steel piping, piping components, and piping elements exposed to lubricating oil. A one-time inspection is recommended to verify the effectiveness of lubricating oil controls in managing corrosion.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage loss of material due to general, pitting and crevice corrosion for cast iron and carbon steel components exposed to lubricating oil with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17).

3.4.2.2.3 *Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion (MIC), and Fouling*

NUREG-1800 item 3.4.2.2.3 relates to loss of material due to general, pitting and crevice corrosion, MIC, and fouling in steel piping components exposed to raw water.

This item is not applicable to VEGP. While the VEGP AMR methodology predicts loss of material for steel piping components exposed to raw water, the VEGP AMR results for S&PC systems do not include steel piping components exposed to raw water. See Item 3.4.1-31 for steel heat exchanger components in the S&PC systems exposed to raw water. Interfacing raw water systems are addressed in the Auxiliary Systems (Section 3.3).

3.4.2.2.4 *Reduction of Heat Transfer Due to Fouling*

(1) Fouling of heat exchanger tubes exposed to treated water

NUREG-1800 item 3.4.2.2.4 (1) relates to reduction of heat transfer due to fouling for stainless steel and copper alloy heat exchanger tubes exposed to treated water. A one-time inspection is recommended to verify the effectiveness of the water chemistry control program.

Consistent with NUREG-1800, VEGP will manage reduction of heat transfer for heat exchanger tubes exposed to treated water with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17).

(2) Fouling of heat exchanger tubes exposed to lube oil

NUREG-1800 item 3.4.2.2.4 (2) relates to reduction of heat transfer due to fouling for stainless steel and copper alloy heat exchanger tubes exposed to lubricating oil. The aging management recommended is lube oil chemistry control and a confirmatory one-time inspection.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage fouling of lubricating oil cooler heat transfer surfaces with the Oil Analysis Program (Appendix B.3.16) and the One-Time Inspection Program (Appendix B.3.17).

3.4.2.2.5 *Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion*

(1) Steel components exposed to soil

NUREG-1800 item 3.4.2.2.5 (1) relates to loss of material due to general, pitting and crevice corrosion, and MIC in steel piping components and tanks exposed to soil.

This item is not applicable to VEGP. While the VEGP AMR methodology predicts loss of material for steel piping components exposed to soil, the VEGP AMR results for S&PC systems do not include steel components exposed to a soil environment.

(2) Steel heat exchanger components exposed to lube oil

NUREG-1800 item 3.4.2.2.5 (2) addresses loss of material due to general, pitting and crevice corrosion, and MIC in steel heat exchanger components exposed to lubricating oil.

This item is not applicable to VEGP. While the VEGP AMR methodology predicts loss of material for steel heat exchanger components exposed to lube oil, The VEGP AMR results for S&PC systems do not include steel heat exchanger components exposed to a lubricating oil environment.

3.4.2.2.6 *Cracking due to Stress Corrosion Cracking*

NUREG-1800 item 3.4.2.2.6 relates to cracking due to SCC in stainless steel piping, piping components, piping elements, tanks, and heat exchanger components exposed to treated water greater than 140 ºF. The aging management recommended is the water chemistry control program with a confirmatory one-time inspection.

Consistent with NUREG-1800, VEGP will manage cracking for stainless steel components exposed to treated water greater than 140 ºF with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17).

3.4.2.2.7 *Loss of Material due to Pitting and Crevice Corrosion*

(1) Components exposed to treated water

NUREG-1800 item 3.4.2.2.7 (1) relates to loss of material due to pitting and crevice corrosion for stainless steel, aluminum, and copper alloy piping, piping components and piping elements and for stainless steel tanks and heat exchanger components exposed to treated water. The aging management recommended is the water chemistry control program with a confirmatory one-time inspection.

Consistent with NUREG-1800, VEGP will manage loss of material for stainless steel and aluminum alloy components exposed to treated water with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17). Aluminum alloy components included in this further evaluation section are located in the Sampling system, which is in the auxiliary systems group, not in a S&PC system.

The VEGP AMR results for S&PC systems do not include copper alloy components exposed to a treated water environment.

(2) Stainless steel piping exposed to soil

NUREG-1800 item 3.4.2.2.7 (2) relates to loss of material due to pitting and crevice corrosion for stainless steel piping, piping components, and piping elements exposed to soil. A plant specific program is recommended to manage this effect.

VEGP will manage the buried surfaces of these piping components with the Buried Piping and Tanks Inspection Program (Appendix B.3.4). This program is consistent with NUREG-1801 Section XI.M34 with exceptions.

(3) Copper alloy piping exposed to lube oil

NUREG-1800 item 3.4.2.2.7 (3) relates to loss of material due to pitting and crevice corrosion for copper alloy piping, piping components, and piping elements exposed to lubricating oil.

This item is not applicable to VEGP. While the VEGP AMR methodology predicts loss of material for copper alloy components exposed to lube oil, the VEGP AMR results for S&PC systems do not include copper alloy piping components exposed to a lubricating oil environment.

3.4.2.2.8 *Loss of Material due to Pitting, Crevice, and Microbiologically-Influenced Corrosion*

NUREG-1800 item 3.4.2.2.8 relates to loss of material due to pitting and crevice corrosion, and MIC in stainless steel piping, piping components, piping elements, and heat exchanger components exposed to lubricating oil. The aging management recommended is lube oil chemistry control and a confirmatory one-time inspection.

Consistent with NUREG-1800 with aging management program exceptions, VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17).

3.4.2.2.9 *Loss of Material due to General, Pitting, Crevice, and Galvanic Corrosion*

NUREG-1800 item 3.4.2.2.9 relates to general, pitting, crevice, and galvanic corrosion for steel heat exchanger components exposed to treated water in BWRs.

This item is only applicable to BWRs and is not applicable to VEGP (a Westinghouse PWR).

3.4.2.2.10 *Quality Assurance for Aging Management of Nonsafety-Related Components*

Quality Assurance provisions applicable to license renewal are discussed in Appendix B.1.3.

3.4.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the steam and power conversion systems components.

- Metal Fatigue (Section 4.3)

3.4.3 CONCLUSION

The Steam and Power Conversion Systems piping and components subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with the Steam and Power Conversion systems are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.4.1 Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-1	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 (See subsection 3.4.2.2.1)	Cracking of metal components due to cumulative fatigue damage is addressed as a TLAA. See Section 3.4.2.2.1 for further discussion.
3.4.1-2	Steel piping, piping components, and piping elements exposed to steam	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.2.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.2(1) for further discussion.
3.4.1-3	Steel heat exchanger components exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.2.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.2(1) for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-4	Steel piping, piping components, and piping elements exposed to treated water	Loss of material due to general, pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.2.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.2(1) for further discussion.
3.4.1-5	BWR Only				
3.4.1-6	Steel and stainless steel tanks exposed to treated water	Loss of material due to general (steel only) pitting and crevice corrosion	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.7.1, except for steel tanks see subsection 3.4.2.2.2.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.2(1) and Section 3.4.2.2.7(1) for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-7	Steel piping, piping components, and piping elements exposed to lubricating oil	Loss of material due to general, pitting and crevice corrosion	Lubricating Oil Analysis and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.2.2)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.2(2) for further discussion.
3.4.1-8	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	Plant specific	Yes, plant specific (See subsection 3.4.2.2.3)	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include piping components exposed to a raw water environment. See Item 3.4.1-31 for steel heat exchanger components in the S&PC systems exposed to raw water. Interfacing raw water systems are addressed in the Auxiliary Systems (Section 3.3). See Section 3.4.2.2.3 for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.4.1-9	Stainless steel and copper alloy heat exchanger tubes exposed to treated water	Reduction of heat transfer due to fouling	Water Chemistry and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.4.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.4(1) for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.4.2)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.4(2) for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 Surveillance or Buried Piping and Tanks Inspection	No Yes, detection of aging effects and operating experience are to be further evaluated (See subsection 3.4.2.2.5.1)	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include steel components exposed to a soil environment. See Section 3.4.2.2.5(1) for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.5.2)	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include steel heat exchanger components exposed to a lubricating oil environment. See Section 3.4.2.2.5(2) for further discussion.
3.4.1-13	BWR Only				

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.6)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.6 for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.7.1)	Consistent with NUREG-1801 for aluminum alloy components. VEGP will manage loss of material in aluminum alloy components with the Water Chemistry Control Program (Appendix B.3.28) and the One-Time Inspection Program (Appendix B.3.17). The VEGP AMR results for S&PC systems do not include any aluminum alloy components aligned to this summary item. However, Sampling System components in the auxiliary systems group are included. Not applicable for copper alloy components. The VEGP AMR results for S&PC systems do not include any copper alloy components exposed to a treated water environment. See Section 3.4.2.2.7(1) for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.7.1)	Consistent with NUREG-1801. VEGP will manage the aging effect with the Water Chemistry Control Program (Appendix B.3.28) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.7(1) for further 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	Plant specific	Yes, plant specific (See subsection 3.4.2.2.7.2)	VEGP will manage these components with the Buried Piping and Tanks Inspection Program (Appendix B.3.4). See Section 3.4.2.2.7(2) for further discussion.
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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.7.3)	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include copper alloy piping components exposed to a lubricating oil environment. See Section 3.4.2.2.7(3) for further discussion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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 and One-Time Inspection	Yes, detection of aging effects is to be evaluated (See subsection 3.4.2.2.8)	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Oil Analysis Program (Appendix B.3.16) and One-Time Inspection Program (Appendix B.3.17). See Section 3.4.2.2.8 for further discussion.
3.4.1-20	Steel tanks exposed to air – outdoor (external)	Loss of material/ general, pitting, and crevice corrosion	Above ground Steel Tanks	No	Different than NUREG-1801. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8).
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not contain high strength bolting. CMTRs for a sample population of A193 Gr. B7 bolting used at VEGP were reviewed and it was concluded that the actual yield strengths of this bolting material do not exceed 150 ksi. VEGP operating experience supports this conclusion.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	VEGP will manage the aging effect with the Bolting Integrity Program (Appendix B.3.2).
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not include a Closed-Cycle Cooling Water environment.
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not include a Closed-Cycle Cooling Water environment.
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not include copper alloy with > 15% Zn content exposed to a Closed-Cycle Cooling Water environment.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not include a Closed-Cycle Cooling Water environment.
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	No	This item is not applicable to VEGP. The VEGP S&PC systems do not include a Closed-Cycle Cooling Water environment.
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the External Surfaces Monitoring Program (Appendix B.3.8). However, SNC considers components with normal operating temperatures exceeding 212 ºF to be subject to different environmental conditions where moisture does not exist. For these component external surfaces, loss of material due to corrosion is not an aging effect requiring management.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP manages the aging effect with the Flow Accelerated Corrosion Program (Appendix B.3.10).
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	No	Consistent with NUREG-1801 with aging management program exceptions. VEGP will manage the aging effect with the Piping and Duct Internal Inspection Program (Appendix B.3.22).
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	No	Different than NUREG-1801 for components exposed to raw water – river water. VEGP manages loss of material in the Steam Generator Blowdown System Trim Heat Exchanger exposed to "raw water –river water" with the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21).
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	No	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include stainless steel or copper alloy piping components exposed to a raw water environment.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	No	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include stainless steel heat exchanger components in a raw water environment.
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	No	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include heat exchanger tubes in a raw water environment.
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	No	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include copper alloy components.
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	No	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include gray cast iron components.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Water Chemistry Control Program (Appendix B.3.28).
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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Boric Acid Corrosion Control Program (Appendix B.3.3).
3.4.1-39	Stainless steel piping, piping components, and piping elements exposed to steam	Cracking due to stress corrosion cracking	Water Chemistry	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Water Chemistry Control Program (Appendix B.3.28).
3.4.1-40	Glass piping elements exposed to air, lubricating oil, raw water, and treated water	None	None	NA - No AEM or AMP	This item is not applicable to VEGP. The VEGP AMR results for S&PC systems do not include glass piping elements.

Table 3.4.1 (Cont'd) Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-42	Steel piping, piping components, and piping elements exposed to air – indoor controlled (external)	None	None	NA - No AEM or AMP	The VEGP AMR results for S&PC systems do not use the air – indoor controlled environment. See summary Item 3.4.1-28.
3.4.1-43	Steel and stainless steel piping, piping components, and piping elements in concrete	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.
3.4.1-44	Steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.4.2-1 Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-4	3.4.1-22	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-2	3.4.1-38	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VIII.H-5	3.4.1-22	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-1	3.4.1-22	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 401
1f	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
2a	Filter Housings - ARV Local (Manual) Actuators	Pressure Boundary	Aluminum Alloy	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
2b	Filter Housings - ARV Local (Manual) Actuators	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E 402

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3a	Flexible Connectors	Pressure Boundary	Ni Alloy	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	None	None	F
3b	Flexible Connectors	Pressure Boundary	Ni Alloy	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	None	None	F
3c	Flexible Connectors	Pressure Boundary	Ni Alloy	Air – Indoor (Exterior)	None	None Required	VIII.I-9	3.4.1-41	C
3d	Flexible Connectors	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
4a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Interior) (Wetted and T > 140 °F)	Cracking	One-Time Inspection Program	None	None	G
4b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Interior) (Wetted)	Loss of Material	One-Time Inspection Program	None	None	G

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	A
4d	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-3	3.4.1-37	A
4e	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-5	3.4.1-14	A
4f	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
4g	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4h	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
5a	Flow Restrictors - ARV Discharge Paths	Flow Restriction	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
5b	Flow Restrictors - ARV Discharge Paths	Flow Restriction	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
5c	Flow Restrictors - ARV Discharge Paths	Flow Restriction	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G
5d	Flow Restrictors - ARV Discharge Paths	Flow Restriction	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
6a	Oil Reservoirs - ARV Local (Manual) Actuators	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6b	Oil Reservoirs - ARV Local (Manual) Actuators	Pressure Boundary	Stainless Steel	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
6c	Oil Reservoirs - ARV Local (Manual) Actuators	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
7a	Oil Reservoirs Filler / Breather Caps – ARV Local (Manual) Actuators	Debris Protection Pressure Boundary	Aluminum Alloy	Air – Outdoor (Interior)	Loss of Material	One-Time Inspection Program	None	None	J
7b	Oil Reservoirs Filler / Breather Caps – ARV Local (Manual) Actuators	Debris Protection Pressure Boundary	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E
8a	Piping Components	Pressure Boundary Flow Direction	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B 410
8b	Piping Components	Pressure Boundary	Carbon Steel	Gas – Dried (Interior)	None	None Required	VIII.I-15	3.4.1-44	A

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8c	Piping Components	Pressure Boundary	Carbon Steel	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
8d	Piping Components	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-8	3.4.1-37	A
8e	Piping Components	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.B1-9	3.4.1-29	B
8f	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-11	3.4.1-4	A
8g	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	B
8h	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
8i	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
8j	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8k	Piping Components	Pressure Boundary Flow Direction	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B 410
8l	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
8m	Piping Components	Pressure Boundary	Stainless Steel	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
8n	Piping Components	Pressure Boundary	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	A
8o	Piping Components	Pressure Boundary	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-3	3.4.1-37	A
8p	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-5	3.4.1-14	A
8q	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8r	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
9a	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-8	3.4.1-37	C
9b	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.B1-9	3.4.1-29	D
9c	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
10a	Pump Casings - ARV Manual Hand Pumps	Pressure Boundary	Carbon Steel	Hydraulic Fluid (Interior)	Loss of Material	One-Time Inspection Program Oil Analysis Program	None	None	G
10b	Pump Casings - ARV Manual Hand Pumps	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
11a	Pump Casings - Wet Layup Recirc Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.F-24	3.4.1-14	A
11b	Pump Casings - Wet Layup Recirc Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
11c	Pump Casings - Wet Layup Recirc Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
12a	Valve Bodies	Pressure Boundary	Aluminum Alloy	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
12b	Valve Bodies	Pressure Boundary	Aluminum Alloy	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	III.B2-7	3.5.1-50	E
12c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B
12d	Valve Bodies	Pressure Boundary	Carbon Steel	Gas – Dried (Interior)	None	None Required	VIII.I-15	3.4.1-44	A

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12e	Valve Bodies	Pressure Boundary	Carbon Steel	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
12f	Valve Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-8	3.4.1-37	A
12g	Valve Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.B1-9	3.4.1-29	B
12h	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-11	3.4.1-4	A
12i	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	B
12j	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
12k	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
12l	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12m	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
12n	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
12o	Valve Bodies	Pressure Boundary	Stainless Steel	Hydraulic Fluid (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
12p	Valve Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	A
12q	Valve Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-3	3.4.1-37	A
12r	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-5	3.4.1-14	A
12s	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A

Table 3.4.2-1 (cont'd) Main Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12t	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-2 Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-4	3.4.1-22	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VIII.H-5	3.4.1-22	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-1	3.4.1-22	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 401
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-2	3.4.1-38	A
2a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
2b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.D1-9	3.4.1-29	B

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Carbon Steel	Treated Water (Exterior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
2d	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Carbon Steel	Treated Water (Exterior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.D1-9	3.4.1-29	B
2e	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
2f	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-5	3.4.1-14	A
2g	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2h	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air Outdoor (Exterior)	None	None Required	None	None	G
2i	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Exterior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
2j	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Exterior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-5	3.4.1-14	A
3a	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
3b	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.D1-9	3.4.1-29	B
3c	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3d	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
3e	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
3f	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
3g	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
3h	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T ≥ 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-5	3.4.1-14	A
3i	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
3j	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3k	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
3l	Piping Components	Pressure Boundary	Stainless Steel	Soil (Exterior)	Loss of Material	Buried Piping and Tanks Inspection Program	VIII.E-28	3.4.1-17	E 411
4a	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
4b	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.D1-9	3.4.1-29	B
4c	Piping Components - Forged Sections for 5-Way Pipe Restraints	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
5a	Piping Components - Guard Pipe	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Piping Components - Guard Pipe	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
5c	Piping Components - Guard Pipe	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
6a	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-8	3.4.1-4	A
6b	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.D1-9	3.4.1-29	B
6c	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
6d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
6e	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403

Table 3.4.2-2 (Cont'd) Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
6g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
6h	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-4	3.4.1-16	A
6i	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.D1-5	3.4.1-14	A
6j	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
6k	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.4.2-3 Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-4	3.4.1-22	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VIII.H-5	3.4.1-22	E
1c	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-2	3.4.1-38	A
2a	Filter Housings	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A 404
2b	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
2c	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2d	Filter Housings	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
2e	Filter Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
3a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
3b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	One-Time Inspection Program	None	None	G 405
3c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
4a	Heat Exchangers - SGBD HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-28	3.4.1-3	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4b	Heat Exchangers - SGBD HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
5a	Heat Exchangers - SGBD HXs (Shells)	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-28	3.4.1-3	A
5b	Heat Exchangers - SGBD HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
6a	Heat Exchangers - SGBD Trim HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-28	3.4.1-3	A
6b	Heat Exchangers - SGBD Trim HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
6c	Heat Exchangers - SGBD Trim HXs (Channel Heads)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
7a	Heat Exchangers - SGBD Trim HXs (Shells)	Pressure Boundary	Carbon Steel	Raw Water – River Water (Interior)	Loss of Material	Periodic Surveillance and Preventive Maintenance Activities	VIII.F-5	3.4.1-31	E
7b	Heat Exchangers - SGBD Trim HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
7c	Heat Exchangers - SGBD Trim HXs (Shells)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
8a	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A
8b	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material – FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	B
8c	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	Flow Accelerated Corrosion Program	None	None	G 409

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8d	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
8e	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
8f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T≥ 212ºF)	None	None Required	None	None	G 403
8g	Piping Components	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	VIII.I-12	3.4.1-44	A
8h	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
8i	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	One-Time Inspection Program	None	None	G 405
8j	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9a	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
9b	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
9c	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A 406
9d	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
9e	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
10a	Pump Casings - Steam Generator Drain Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
10b	Pump Casings - Steam Generator Drain Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
11a	Pump Casings - Steam Generator Blowdown Spent Resin Sluice Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
11b	Pump Casings - Steam Generator Blowdown Spent Resin Sluice Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
12a	Strainer Housings	Pressure Boundary	Stainless Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	One-Time Inspection Program	None	None	G 405
12b	Strainer Housings	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13a	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-25	3.4.1-4	A
13b	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	B
13c	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	Flow Accelerated Corrosion Program	None	None	G 409
13d	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
13e	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
13f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) ($T \geq 212^{\circ}F$)	None	None Required	None	None	G 403
13g	Valve Bodies	Pressure Boundary	Stainless Steel	Gas – Dried (Interior)	None	None Required	VIII.I-12	3.4.1-44	A

Table 3.4.2-3 (Cont'd) Steam Generator Blowdown Processing System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
13h	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-23	3.4.1-16	A
13i	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior) (Aggressive Chemistry)	Loss of Material	One-Time Inspection Program	None	None	G 405
13j	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A

Table 3.4.2-4 Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-4	3.4.1-22	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VIII.H-5	3.4.1-22	E
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-2	3.4.1-38	A
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-1	3.4.1-22	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 401
1f	Closure Bolting	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 401
2a	Filter Housings	Pressure Boundary	Aluminum Alloy	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	None	None	G
2b	Filter Housings	Pressure Boundary	Aluminum Alloy	Air – Indoor (Exterior)	None	None Required	VII.J-1	3.3.1-95	A

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2c	Filter Housings	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-35	3.4.1-7	B
2d	Filter Housings	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
3a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G 408
3b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A
3c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
4a	Oil Coolers – TDAFWP Turbine (Channel Heads)	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-27	3.4.1-16	A

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4b	Oil Coolers – TDAFWP Turbine (Channel Heads)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	C
5a	Oil Coolers – TDAFWP Turbine (Shells)	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-3	3.4.1-19	B
5b	Oil Coolers – TDAFWP Turbine (Shells)	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	C
6a	Oil Coolers – TDAFWP Turbine (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-27	3.4.1-16	A
6b	Oil Coolers – TDAFWP Turbine (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Treated Water (Interior)	Reduction of Heat Transfer	Water Chemistry Control Program One-Time Inspection Program	VIII.F-10	3.4.1-9	A

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6c	Oil Coolers – TDAFWP Turbine (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-3	3.4.1-19	B
6d	Oil Coolers – TDAFWP Turbine (Tubes)	Pressure Boundary Exchange Heat	Stainless Steel	Lube Oil (Exterior)	Reduction in Heat Transfer	Oil Analysis Program One-Time Inspection Program	VIII.G-12	3.4.1-10	B
7a	Oil Coolers – TDAFWP Turbine (Tubesheets)	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.F-27	3.4.1-16	A
7b	Oil Coolers – TDAFWP Turbine (Tubesheets)	Pressure Boundary	Stainless Steel	Lube Oil (Exterior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-3	3.4.1-19	B
8a	Oil Reservoirs - TDAFWP Turbine Lube Oil	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	One-Time Inspection Program Oil Analysis Program	VIII.G-35	3.4.1-7	D

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
8b	Oil Reservoirs - TDAFWP Turbine Lube Oil	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
9a	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B 408
9b	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-38	3.4.1-4	A
9c	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material – FAC	Flow Accelerated Corrosion Program	VIII.G-39	3.4.1-29	B
9d	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
9e	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
9f	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9g	Piping Components	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-35	3.4.1-7	B
9h	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G 408
9i	Piping Components	Pressure Boundary	Stainless Steel	Drainage – Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
9j	Piping Components	Pressure Boundary	Stainless Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-29	3.4.1-19	B
9k	Piping Components	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A
9l	Piping Components	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
9m	Piping Components	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.4.2-4 (Cont'd)   Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
9n	Piping Components	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	VIII.I-11	3.4.1-43	A
9o	Piping Components	Pressure Boundary	Stainless Steel	Drainage – Dirty (Exterior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	G
10a	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
10b	Piping Components – Pipe Spools for Startup Strainers	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A
11a	Pump Casings – AFW Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A
11b	Pump Casings – AFW Pumps	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
12a	Pump Casings – CST Vacuum Degasifier Pumps	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
12b	Pump Casings – CST Vacuum Degasifier Pumps	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
13a	Pump Casings – TDAFWP Lube Oil Pumps	Pressure Boundary	Cast Iron	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-35	3.4.1-7	B
13b	Pump Casings – TDAFWP Lube Oil Pumps	Pressure Boundary	Cast Iron	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
14a	Spargers - TDAFWP steam exhaust condensate	Pressure Boundary Flow Distribution	Stainless Steel	Drainage – Dirty (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	J
14b	Spargers - TDAFWP steam exhaust condensate	Pressure Boundary Flow Distribution	Stainless Steel	Drainage – Dirty (Exterior)	Loss of Material	Piping and Duct Internal Inspection Program	None	None	J
15a	Tank - CST Degasifier Tank	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-41	3.4.1-6	A

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
15b	Tank - CST Degasifier Tank	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.G-40	3.4.1-20	E
16a	Tank Diaphragms - CSTs	Physical Integrity	Elastomer	Treated Water (Interior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	None	None	G 407
16b	Tank Diaphragms - CSTs	Physical Integrity	Elastomer	Air – Outdoor (Exterior)	Change in Material Properties	Periodic Surveillance and Preventive Maintenance Activities	None	None	G 407
17a	Tank Liners (& internals) - CST Liners	Pressure Boundary	Stainless Steel	Air – Outdoor (Interior)	None	None Required	None	None	G
17b	Tank Liners (& internals) - CST Liners	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-41	3.4.1-6	A
17c	Tank Liners (& internals) - CST Liners	Pressure Boundary	Stainless Steel	Concrete (Exterior)	None	None Required	VIII.I-11	3.4.1-43	C

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
18a	Turbine Casings (AFW Pump Drive Turbine)	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	D 408
18b	Turbine Casings (AFW Pump Drive Turbine)	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
19a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Interior)	Loss of Material	Piping and Duct Internal Inspection Program	VIII.B1-6	3.4.1-30	B 408
19b	Valve Bodies	Pressure Boundary	Carbon Steel	Lube Oil (Interior)	Loss of Material	Oil Analysis Program One-Time Inspection Program	VIII.G-35	3.4.1-7	B
19c	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-38	3.4.1-4	A
19d	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material – FAC	Flow Accelerated Corrosion Program	VIII.G-39	3.4.1-29	B
19e	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B

Table 3.4.2-4 (Cont'd) Auxiliary Feedwater System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
19f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material – BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
19g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
19h	Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.G-32	3.4.1-16	A
19i	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
19j	Valve Bodies	Pressure Boundary	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G

Table 3.4.2-5 Auxiliary Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1a	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-4	3.4.1-22	E
1b	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	VIII.H-2	3.4.1-38	A
1c	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Preload	Bolting Integrity Program	VIII.H-5	3.4.1-22	E
1d	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	Bolting Integrity Program	VIII.H-1	3.4.1-22	E
1e	Closure Bolting	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Preload	Bolting Integrity Program	None	None	H 401
2a	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	A
2b	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-5	3.4.1-14	A

Table 3.4.2-5 (Cont'd)   Auxiliary Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
2c	Flow Orifice / Elements	Pressure Boundary Flow Restriction	Stainless Steel	Air – Outdoor (Exterior)	None	None Required	None	None	G
3a	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E
3b	Piping Components	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-4	3.4.1-2	C
3c	Piping Components	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.C-5	3.4.1-29	D
3d	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-7	3.4.1-4	C
3e	Piping Components	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	D
3f	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B

Table 3.4.2-5 (Cont'd) Auxiliary Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
3g	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
3h	Piping Components	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
3i	Piping Components	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B
4a	Steam / Fluid Trap Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-4	3.4.1-2	C
4b	Steam / Fluid Trap Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.C-5	3.4.1-29	D
4c	Steam / Fluid Trap Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-7	3.4.1-4	C
4d	Steam / Fluid Trap Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	D

Table 3.4.2-5 (Cont'd) Auxiliary Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4e	Steam/Fluid Trap Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (T ≥ 212 °F)	None	None Required	None	None	G 403
4f	Steam/Fluid Trap Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program	VIII.B1-3	3.4.1-37	C
4g	Steam/Fluid Trap Bodies	Pressure Boundary	Stainless Steel	Steam (Interior)	Cracking	Water Chemistry Control Program	VIII.B1-2	3.4.1-39	C
4h	Steam/Fluid Trap Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-4	3.4.1-16	C
4i	Steam/Fluid Trap Bodies	Pressure Boundary	Stainless Steel	Treated Water (Interior) (T > 140 °F)	Cracking	Water Chemistry Control Program One-Time Inspection Program	VIII.B1-5	3.4.1-14	C
4j	Steam/Fluid Trap Bodies	Pressure Boundary	Stainless Steel	Air – Indoor (Exterior)	None	None Required	VIII.I-10	3.4.1-41	A
5a	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Interior)	Loss of Material	One-Time Inspection Program	V.A-19	3.2.1-32	E

Table 3.4.2-5 (Cont'd) Auxiliary Steam System: Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5b	Valve Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-4	3.4.1-2	C
5c	Valve Bodies	Pressure Boundary	Carbon Steel	Steam (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.C-5	3.4.1-29	D
5d	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material	Water Chemistry Control Program One-Time Inspection Program	VIII.C-7	3.4.1-4	C
5e	Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (Interior)	Loss of Material - FAC	Flow Accelerated Corrosion Program	VIII.F-26	3.4.1-29	D
5f	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-7	3.4.1-28	B
5g	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) (Borated Water Leakage)	Loss of Material - BAC	Boric Acid Corrosion Control Program	VIII.H-9	3.4.1-38	A
5h	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Indoor (Exterior) ($T \geq 212$ °F)	None	None Required	None	None	G 403
5i	Valve Bodies	Pressure Boundary	Carbon Steel	Air – Outdoor (Exterior)	Loss of Material	External Surfaces Monitoring Program	VIII.H-8	3.4.1-28	B

Standard Notes for Steam and Power Conversion Systems

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.

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

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

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

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

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

Plant Specific Notes for Steam and Power Conversion Systems

401. Loss of preload is conservatively considered to be applicable for all closure bolting. NUREG-1801 only addresses loss of preload for bolting in an air indoor environment.

402. A NUREG-1801 Vol. 2 structural item is cited. A comparable item was not identified in NUREG-1801 V2 Sections IV, V, VII, and VIII.

403. NUREG-1801 Vol. 2 does not include an external surfaces environment with operating temperatures exceeding 212 °F. External surfaces operating at temperatures above this threshold drive off moisture and preclude corrosion of the component external surfaces.

404. FAC is not an applicable aging mechanism for these filter housings due to operating temperature below 200 °F.

405. VEGP operating experience indicates the presence of aggressive chemistry (acidic) conditions downstream of the SGBD demineralizers. The original carbon steel piping materials experienced wall thinning due to chemical attack. Stainless steel piping materials are expected to be resistant to chemical attack. A one-time inspection is credited to confirm the performance of both originally installed and replacement stainless steel piping materials.

406. This component is not FAC susceptible because it is normally isolated and only operated at low temperatures for brief periods during outages.

407. VEGP interprets Change in Material Properties to include cracking resulting from changes in properties.

408. The Turbine Driven Auxiliary Feedwater Pump Turbine is operated less than 4 hours per year, thereby only seeing the steam environment during this minimal operation period. Therefore, the normal operating environment for the TDAFWP turbine casing and the associated exhaust lines is air. Outside air is chosen since the turbine is vented to the outside.

409. VEGP operating experience indicates the presence of aggressive chemistry (acidic) conditions downstream of the SGBD demineralizers. The original carbon steel piping materials have experienced wall thinning due to chemical attack. Inspections to detect wall thinning due to chemical attack are included in the scope of the FAC Program because the inspection methods are identical to the inspection methods used to detect wall thinning due to FAC mechanisms, and no additional aging management programs are required.

410. The Flow Direction component function is only applicable to the main steam safety and atmospheric relief valve vent stacks.

411. The associated NUREG-1801 Vol. 2 item recommends a plant-specific program. The VEGP Buried Piping and Tanks Inspection Program will include stainless steel and copper alloy components exposed to a soil environment.

3.5 AGING MANAGEMENT OF CONTAINMENTS, STRUCTURES AND COMPONENT SUPPORTS

3.5.1 INTRODUCTION

This section provides the results of the aging management review of the structures and component groups identified in Tables 2.4.1 through 2.4.12. The following structures and component groups are addressed in this system group (with the applicable Section 2 reference in parentheses):

- Containment Structures (Section 2.4.1)
- Auxiliary, Control, Fuel Handling and Equipment Buildings (Section 2.4.2)
- Emergency Diesel Generator Structures (Section 2.4.3)
- Turbine Building (Section 2.4.4)
- Tunnels and Duct Banks (Section 2.4.5)
- Nuclear Service Cooling Water (NSCW) Structures (Section 2.4.6)
- Concrete Tank and Valve House Structures (Section 2.4.7)
- Switch Yard Structures (Section 2.4.8)
- Fire Protection Structures (Section 2.4.9)
- Radwaste Structures (Section 2.4.10)
- Auxiliary Feedwater Pump House Structures, (Section 2.4.11)
- Component Supports and Bulk Commodities (Section 2.4.12)

Table 3.5.1, Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801, provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for Structures and Component Supports. Text addressing summary items requiring further evaluation is provided in Section 3.5.2.2.

The format and usage of this Table and the associated further evaluation text is described in Section 3.0.2.

3.5.2 RESULTS

The following tables summarize the results of the aging management reviews for systems in the Structures and Component Supports systems group:

Table 3.5.2-1	Containment Structures – Summary of Aging Management Review
Table 3.5.2-2	Auxiliary, Control, Fuel Handling, and Equipment Buildings – Summary of Aging Management Review
Table 3.5.2-3	Emergency Diesel Generator Structures – Summary of Aging Management Review
Table 3.5.2-4	Turbine Building – Summary of Aging Management Review
Table 3.5.2-5	Tunnels and Duct Banks – Summary of Aging Management Review
Table 3.5.2-6	Nuclear Service Cooling Water Structures – Summary of Aging Management Review
Table 3.5.2-7	Concrete Tank and Valve House Structures – Summary of Aging Management Review
Table 3.5.2-8	Switchyard Structures – Summary of Aging Management Review
Table 3.5.2.9	Fire Protection Structures – Summary of Aging Management Review
Table 3.5.2-10	Radwaste Structures - Summary of Aging Management Review
Table 3.5.2-11	Auxiliary Feedwater Pump House Structures - Summary of Aging Management Review
Table 3.5.2-12	Component Supports and Bulk Commodities – Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the containment, structures and component supports systems in the following Sections:

- Containment Structures (Section 3.5.2.1.1)
- Auxiliary, Control, Fuel Handling, and Equipment Buildings (Section 3.5.2.1.2)
- Emergency Diesel Generator Structures (Section 3.5.2.1.3)
- Turbine Building (Section 3.5.2.1.4)
- Tunnels and Duct Banks (Section 3.5.2.1.5)
- Nuclear Service Cooling Water Structures (Section 3.5.2.1.6)
- Concrete Tank and Valve House Structures (Section 3.5.2.1.7)
- Switchyard Structures (Section 3.5.2.1.8)
- Fire Protection Structures (Section 3.5.2.1.9)
- Radwaste Structures (Section 3.5.2.1.10)
- Auxiliary Feedwater Pump House Structures (Section 3.5.2.1.11)
- Component Supports and Bulk Commodities (Section 3.5.2.1.12)

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

3.5.2.1.1 *Containment Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Containment Structures requiring aging management review are:

- Concrete
- Elastomer
- Stainless Steel
- Steel

Environments

Components of the Containment Structures are exposed to the following environments:

- Air - Indoor
- Air – Outdoor
- Air with Borated Water Leakage
- Borated Water
- Soil

Aging Effects Requiring Management

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

- Cracking
- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Loss of Sealing

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Structure components:

- 10 CFR 50 Appendix J Program (Appendix B.3.29)
- Boric Acid Corrosion Control Program (Appendix B.3.3)
- In-service Inspection Program; ISI – IWE Program (Appendix B.3.30)
- In-service Inspection Program; ISI – IWL Program (Appendix B.3.31)
- Structural Monitoring Program (Appendix B.3.32)
- Water Chemistry Control Program (Appendix B.3.28)

3.5.2.1.2 *Auxiliary, Control, Fuel Handling, and Equipment Buildings Aging Management Review Results*

Materials

The materials of construction for the components of the Auxiliary, Control, Fuel Handling, and Equipment Building structures requiring aging management review are:

- Concrete
- Masonry block
- Stainless Steel
- Steel

Environments

Components of the Auxiliary, Control, Fuel Handling, and Equipment Building structures are exposed to the following environments:

- Air - Indoor
- Air – Outdoor
- Air with Borated Water Leakage
- Borated Water
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary, Control, Fuel Handling, and Equipment Building structures components require management:

- Cracking
- Change in Material Properties
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary, Control, Fuel Handling, and Equipment Building structures components:

- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Structural Monitoring Program (Appendix B.3.32)
- Structural Monitoring Program – Masonry Wall (Appendix B.3.33)
- Water Chemistry Control Program (Appendix B.3.28)

3.5.2.1.3 *Emergency Diesel Generator Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Emergency Diesel Generator Structures requiring aging management review are:

- Concrete
- Steel

Environments

Components of the Emergency Diesel Generator Structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Emergency Diesel Generator Structures components require management:

- Cracking
- Change in Material Properties
- Loss of Material

Aging Management Programs

The following programs manage the aging effects requiring management for the Emergency Diesel Generator Structures components:

- Structural Monitoring Program (Appendix B.3.32)

3.5.2.1.4 *Turbine Building Aging Management Review Results*

Materials

The materials of construction for the components of the Turbine Building Structure requiring aging management review are:

- Concrete
- Steel
- Masonry Block

Environments

Components of the Turbine Building structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building structure components require management:

- Cracking
- Change in material properties
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Turbine Building Structure components:

- Structural Monitoring Program (Appendix B.3.32)
- Structural Monitoring Program – Masonry Wall (Appendix B.3.33)

3.5.2.1.5 *Tunnels and Duct Banks Aging Management Review Results*

Materials

The materials of construction for the components of the Tunnels and Duct Bank Structures requiring aging management review are:

- Concrete
- Steel

Environments

Components of the Tunnels and Duct Bank structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Tunnels and Duct Bank structure components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Tunnels and Duct Bank Structure components:

- Structural Monitoring Program (Appendix B.3.32)

3.5.2.1.6 *Nuclear Service Cooling Water Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Nuclear Service Cooling Water Structures requiring aging management review are:

- Asbestos Cement Board
- Concrete
- Stainless Steel
- Steel

Environments

Components of the Nuclear Service Cooling Water Structures are exposed to the following environments:

- Air - Indoor
- Air – Outdoor
- Raw Water
- Soil
- Water Flowing
- Water Standing

Aging Effects Requiring Management

The following aging effects associated with the Nuclear Service Cooling Water Structures components require management:

- Change in material properties
- Cracking
- Loss of material
- Loss of Material - Erosion

Aging Management Programs

The following programs manage the aging effects requiring management for the Nuclear Service Cooling Water Structures components:

- Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21)
- Structural Monitoring Program (Appendix B.3.32)

3.5.2.1.7 *Concrete Tank and Valve House Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Concrete Tank and Valve House Structures requiring aging management review are:

- Concrete
- Stainless Steel
- Steel

Environments

Components of the Concrete Tank and Valve House Structures are exposed to the following environments:

- Air - Indoor
- Air – Outdoor
- Soil
- Raw Water

Aging Effects Requiring Management

The following aging effects associated with the Concrete Tank and Valve House Structures components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Concrete Tank and Valve House Structures components:

- Structural Monitoring Program (Appendix B.3.32)

3.5.2.1.8 *Switchyard Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Switchyard Structures requiring aging management review are:

- Concrete
- Masonry block
- Steel

Environments

Components of the Switchyard Structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Switchyard Structures components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Switchyard Structures components:

- Structural Monitoring Program (Appendix B.3.32)
- Structural Monitoring Program – Masonry Wall (Appendix B.3.33)

3.5.2.1.9 *Fire Protection Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Fire Protection Structures requiring aging management review are:

- Concrete
- Masonry Block
- Steel

Environments

Components of the Fire Protection Structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Fire Protection Structures components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Fire Protection Structures components:

- Structural Monitoring Program (Appendix B.3.32)
- Structural Monitoring Program – Masonry Wall (Appendix B.3.33)

3.5.2.1.10 *Radwaste Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Radwaste Structures requiring aging management review are:

- Concrete
- Masonry Block
- Steel

Environments

Components of the Radwaste Structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Radwaste Structures components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Radwaste Structures components:

- Structural Monitoring Program (Appendix B.3.32)
- Structural Monitoring Program – Masonry Wall (Appendix B.3.33)

3.5.2.1.11 *Auxiliary Feedwater Pump House Structures Aging Management Review Results*

Materials

The materials of construction for the components of the Auxiliary Feedwater Pump House Structures requiring aging management review are:

- Concrete
- Steel

Environments

Components of the Auxiliary Feedwater Pump House Structures are exposed to the following environments:

- Air - Indoor
- Air - Outdoor
- Soil

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Feedwater Pump House Structures components require management:

- Change in material properties
- Cracking
- Loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Feedwater Pump House Structures components:

- Structural Monitoring Program (Appendix B.3.32)

3.5.2.1.12 *Component Supports and Bulk Commodities Aging Management Review Results*

Materials

The materials of construction for the Component Supports and Bulk Commodities requiring aging management review are:

- Aluminum
- Cementitious (Fire Proofing)
- Concrete
- Elastomer
- Fire Proofing Materials
- Gypsum
- Lubrite®
- Masonry Block
- Stainless Steel
- Steel

Environments

Component Supports and Bulk Commodities are exposed to the following environments:

- Air - Indoor
- Air – Outdoor
- Air with Borated Water Leakage

Aging Effects Requiring Management

The following aging effects associated with the Component Supports and Bulk Commodities require management:

- Change in Material Properties
- Cracking
- Loss of Material
- Loss of Material – Boric Acid Corrosion (BAC)
- Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation
- Separation

Aging Management Programs

The following programs manage the aging effects requiring management for the Component Supports and Bulk Commodities:

- Boric Acid Corrosion Control Program (Appendix B.3.3)
- Fire Protection Program (Appendix B.3.9)
- Inservice Inspection Program – IWF (Appendix B.3.13)
- Structural Monitoring Program (Appendix B.3.32)

3.5.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Structures and Component Supports

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.5.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.5.2.2.1 *PWR and BWR Containments*

3.5.2.2.1.1 Aging of Inaccessible Concrete Areas

NUREG-1800 item 3.5.2.2.1.1 relates to potential aging of inaccessible concrete areas in concrete and steel containments due to aggressive chemical attack and corrosion of embedded steel. NUREG-1801 indicates that further evaluation is necessary if the environment is aggressive.

VEGP containment inaccessible and accessible concrete areas are designed in accordance with American Concrete Institute (ACI) Specification 318-71. The resulting reinforced concrete is dense, with low permeability.

Degradation due to aggressive chemical attack is not applicable to VEGP. Aggressive chemical attack only becomes significant when environmental conditions exceed threshold values (Chlorides > 500 ppm, Sulfates >1500 ppm, and pH < 5.5). VEGP is not located in areas exposed to sulfate or chloride attack, nor is it located near industrial plants whose emissions could alter environmental parameters. Groundwater analyses confirm that the VEGP site groundwater is not aggressive. Historical results are presented in VEGP UFSAR Table 2.4-12-3. Testing performed in November 2005 and May 2007 found pH values between 5.77 and 8.24, chloride values between 1.95 and 8.71 ppm, and sulfate values between 2.9 ppm and 12.5 ppm. Resistance to mild acid attack is enhanced through the use of dense concrete that has low permeability and a low water to cement ratio. The VEGP concrete structure uses a dense, low permeable concrete with a maximum water- to-cement ratio of 0.45, which provides an acceptable degree of protection against aggressive chemical attack.

Corrosion of embedded steel becomes significant environmental conditions are found to be aggressive. As noted above, VEGP groundwater analyses confirm that the VEGP site groundwater is not aggressive. Additionally, corrosion is not significant if the concrete has a low water to cement ratio, low permeability, and designed in accordance with ACI Standards (ACI 318 or ACI 349). The design and construction of the VEGP concrete structures generally prevents corrosion of embedded steel from occurring. However, Minor corrosion of embedded steel has been observed in few locations at different VEGP concrete structures. As a result, corrosion of embedded steel is managed by the Inservice Inspection Program - IWL and Structural Monitoring Program (SMP).

For Inaccessible Areas at VEGP, continued implementation of the Structural Monitoring Program is sufficient to address leaching of calcium hydroxide and corrosion of embedded steel since:

(1) VEGP concrete was constructed to design requirements in accordance with ACI recommendations which produced a dense concrete with low permeability. Further, VEGP used a concrete design mix with maximum water- cement ratio of 0.35 - 0.45 which is specified by ACI Standards to be chemically resistant and watertight.

(2) Containment concrete surfaces are not exposed to flowing water and groundwater data indicates that an aggressive environment is not present at VEGP.

(3) The Structural Monitoring Program for VEGP will be enhanced to include requirements to inspect the condition of below grade concrete when it is exposed during excavation.

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 Structural Monitoring Program

NUREG-1800 item 3.5.2.2.1.2 indicates that cracks due to increased stress levels from settlement could occur in PWR containments. Additionally, reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations could occur in PWR containments. For plants that rely on a dewatering system, NUREG-1801 recommends verification of the continued functionality of the dewatering system during the period of extended operation. For all plants, NUREG-1801 recommends no further evaluation if these issues are managed by the applicant's Structural Monitoring Program.

VEGP does not rely on a dewatering system for control of settlement.

Differential settlement and erosion of porous concrete sub-foundations is not applicable to VEGP. VEGP structures are typically founded on consolidated backfill that is not subject to significant settlement. The concrete foundations at VEGP are not constructed of porous concrete and are not subject to flowing water.

Nonetheless, the absence of these aging effects is confirmed by inspections performed by the Inservice Inspection Program – IWL and the Structural Monitoring Program. In addition, settlement monitoring of various site structures is performed at VEGP and credited in the Structural Monitoring Program.

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

NUREG-1800 item 3.5.2.2.1.3 relates to reduction of strength and modulus of concrete due to elevated temperatures. NUREG-1801 recommends further evaluation of a plant-specific aging management program if any portion of the concrete containment components exceed specified temperature limits, i.e., general area temperature greater than 150 °F and local area temperature greater than 200 °F.

This NUREG-1801 item is not applicable to VEGP. Containment concrete degradation due to elevated temperatures is not applicable, because there are no containment concrete structural components exceed the specified temperature limits. The containment is maintained below a bulk average temperature of 120°F by the Containment Cooling System. The area between the primary shield wall and the reactor vessel is maintained at a temperature below 150°F by the Primary Shield and Reactor Supports Cooling System. In the case of piping carrying hot fluid, the pipe is insulated and the flued head penetration is designed to prevent excessive concrete temperatures and to prevent excessive heat losses from the fluid. The penetration assemblies are designed to limit the local area temperature of the concrete at the penetrations below a maximum temperature of 200 °F .

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

NUREG-1800 item 3.5.2.2.1.4 relates to loss of material due to general, pitting and crevice corrosion for steel elements of accessible and inaccessible areas of containments. The ASME Section XI, Subsection IWE and 10 CFR 50 Appendix J Programs are recommended to manage this aging effect. NUREG-1801 recommends further evaluation of plant-specific programs to manage this aging effect for inaccessible areas if corrosion is significant.

Corrosion for inaccessible areas (e.g., embedded containment liner) is not expected for VEGP because containment concrete in contact with the embedded containment liner at VEGP was designed, constructed, and inspected in accordance with applicable ACI and ASTM standards, which provide for a good quality, dense, well cured, and low permeability concrete. Design practices and procedural controls ensured that the concrete was consistent with the recommendations and guidance provided by ACI 201.2R.

Nonetheless, the absence of concrete aging effects is confirmed by inspections performed by the Inservice Inspection Program – IWE and the Structural Monitoring Program. Additionally, the Boric Acid Corrosion Control Program will manage corrosion of surfaces exposed to borated water leakage.

3.5.2.2.1.5 Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

NUREG-1800 item 3.5.2.2.1.5 relates to loss of prestress forces due to relaxation, shrinkage, creep, and elevated temperature for prestressed concrete containments. If loss of prestress is identified to be a Time-Limited Aging Analysis (TLAA), then it is required to be evaluated consistent with the 10 CFR 54.21(c).

The VEGP Containment Buildings are prestressed concrete containments. Loss of prestress forces for PWR prestressed concrete containments is a Time-Limited Aging Analysis (TLAA) as defined in 10 CFR 54.3. The evaluation of this TLAA for VEGP is addressed separately in Section 4.5, “Concrete Containment Tendon Prestress Analysis.”

3.5.2.2.1.6 Cumulative Fatigue Damage

NUREG-1800 item 3.5.2.2.1.6 relates to fatigue analyses of containment components including suppression pool steel shells (including welded joints) and penetrations (including penetration sleeves, dissimilar metal welds, and penetration bellows If such fatigue analyses are determined to be Time-Limited Aging Analyses (TLAAs), then they are required to be evaluated consistent with the 10 CFR 54.21(c).

Fatigue analyses were identified for VEGP containment penetrations that experience significant cyclic loading. The evaluation of this TLAA for VEGP is addressed separately in Section 4.6, “Penetration Load Cycles”.

Fatigue analyses for the VEGP containment liner plate are not part of the current licensing basis and therefore do not meet the definition of a TLAA as based on 10 CFR 54.3.

3.5.2.2.1.7 Cracking due to Stress Corrosion Cracking (SCC)

NUREG-1800 item 3.5.2.2.1.7 relates to cracking due to stress corrosion cracking of stainless steel penetration sleeves, penetration bellows, and dissimilar metal welds. Further evaluation is recommended to ensure that this aging effect is adequately managed.

The VEGP AMR results conclude that cracking due to stress corrosion cracking (SCC) is not an aging effect requiring management for VEGP 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 VEGP, these two conditions are not simultaneously present for any stainless steel penetration sleeves, bellows, or dissimilar metal welds. Further, reviews of VEGP plant-specific operating experience did not identify any SCC of these components.

3.5.2.2.1.8 Cracking due to Cyclic Loading

NUREG-1800 item 3.5.2.2.1.8 relates to cracking due to cyclic loading in shells and penetrations. Existing programs include the ASME Section XI, Subsection IWE and 10 CFR 50 Appendix J. However, NUREG-1801 recommends further evaluation, noting that visual examinations implemented by these programs may not have the ability to detect fine cracks that may result from cracking due to cyclic loading.

VEGP containment penetrations that experience significant cyclic loading have fatigue analyses that are evaluated as TLAAs. See Section 3.5.2.2.1.7 for further discussion. The VEGP AMR results conclude that cracking due to cyclic loading for containment components without CLB fatigue analyses is not an aging effect requiring management. These components are designed to withstand operating stress levels and as such, cracking due to cyclic loading is unlikely to occur. Further, reviews of VEGP operating experience did not identify any events related to cyclic loading induced cracking of containment components.

This subsection also lists components associated with BWR primary containment that require aging management for crack initiation and growth due to stress corrosion cracking (SCC). These components are not applicable to VEGP, a PWR.

3.5.2.2.1.9 Loss of Material (Scaling, Cracking and Spalling) due to Freeze-Thaw

NUREG-1800 item 3.5.2.2.1.9 relates to loss of material (scaling, cracking, and spalling) due to freeze-thaw in concrete containments. ASME Section XI, Subsection IWL program is recommended to manage this aging effect. However, NUREG-1801 recommends further evaluation of this aging effect for plants located in moderate to severe weathering conditions.

Loss of material due to freeze-thaw effects is not an aging effect requiring management for VEGP. VEGP is located very close to region of negligible weathering conditions based on ASTM C33. Normal winter temperatures are mild, with normal winter lows only in the mid 30s. Concrete structures at VEGP were designed, constructed, and inspected in accordance with applicable ACI and ASTM standards, which provide for a good quality, dense, well cured, and low permeability concrete. Concrete structures are not exposed to saturated water conditions.

Examinations of the accessible concrete performed by the Inservice Inspection Program - IWL have not identified any degradation due to freeze-thaw effects.

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

NUREG-1800 item 3.5.2.2.1.10 relates to cracking due to expansion and reaction with aggregate, and to increase in porosity and permeability due to leaching of calcium hydroxide in concrete elements of containments. ASME Section XI, Subsection IWL is recommended to manage this aging effect. NUREG-1801 recommends further evaluation if the concrete was not constructed in accordance with the recommendations in ACI 201.2R.

Concrete was constructed equivalent to recommendations in ACI 201.2R.

Cracking due to expansion and reaction with aggregate is not an aging effect requiring management for VEGP. Concrete aggregates used in VEGP concrete structures were selected per ASTM C33, which uses ASTM C295 “Petrographic Examination of Aggregates for Concrete”. Aggregates identified as potentially reactive were not used at VEGP.

Loss of material due to leaching of calcium hydroxide is conservatively considered to be an aging effect requiring management for VEGP. There have been minor indications of leaching in below grade concrete in VEGP structures other than the Containment Building. Leaching of calcium hydroxide from reinforced concrete becomes significant only if the concrete is exposed to flowing water. Resistance to leaching is enhanced by using a dense, well-cured concrete with low permeability. The VEGP containment structure and the other in-scope structures are not exposed to flowing water. These structures are designed in accordance with ACI 318 and constructed in accordance with ACI 301 and ASTM standards. VEGP manages loss of material due to leaching of calcium hydroxide with the Inservice Inspection Program – IWL, and the Structural Monitoring Program. The Structural Monitoring Program for VEGP will be enhanced to include requirements to inspect the condition of below grade concrete when it is exposed during excavation. These aging management activities are consistent with the GALL Report.

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 Structural Monitoring Program

NUREG-1800 item 3.5.2.2.2.1 concerns evaluation of certain structure/aging effect combinations if not covered by the structural structures monitoring program. Further evaluation is necessary only for structure/aging effect combinations not covered by the structures monitoring program. Additionally, further evaluation is recommended to address wear of Group 4 Lubrite® components if not included in the Structural Monitoring Program or Inservice Inspection Program – IWF.

The VEGP AMR results conclude that only corrosion of embedded steel, and leaching of calcium hydroxide are applicable to VEGP due to the type of construction and design, geographic location, and below grade water chemistry of VEGP. For steel elements, loss of material due to corrosion is the only applicable aging effect requiring management. However, all VEGP in-scope structures are managed by the Inservice Inspection Program and/or the Structural Monitoring Program. These programs will identify cracking, loss of material, and change in material properties irrespective of the underlying mechanism.

For degradation due to aggressive chemical attack, freeze-thaw, expansion and reaction with aggregates, and cracks and distortion due to increased stress levels, the bases for these VEGP results are the same as presented for the Containment Building. See Sections 3.5.2.2.1.1, 3.5.2.2.1.2, 3.5.2.2.1.3, 3.5.2.2.1.4, 3.5.2.2.1.5, 3.5.2.2.1.9, 3.5.2.2.1.10. See Section 3.5.2.2.2.2(4) for discussion regarding aggressive chemical attack. For reduction in foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundation and lockup due to wear, see below.

Reduction in foundation strength, cracking and differential settlement due to erosion of porous concrete subfoundation are not aging effects requiring management at VEGP. VEGP structures are not constructed of porous concrete. Concrete was provided in accordance with ACI and ASTM requirements resulting in dense, well-cured, high strength concrete with low permeability. Structures at VEGP are monitored for settlement and no indication of excessive differential settlement has been detected

Lubrite® materials for nuclear applications are designed to resist deformation, have a low coefficient of friction, resist softening at elevated temperatures, resist corrosion, withstand high intensities of radiation, and will not score or mar. Therefore, lock-up due to wear for Lubrite® plates is not an aging effect requiring management at VEGP. Nonetheless, Lubrite® plates inspections performed by the Structural Monitoring Program and Inservice Inspection Program (IWF) confirm the absence of wear.

3.5.2.2.2.2 Aging Management of Inaccessible Areas

(1) Loss of material due to freeze-thaw

NUREG-1800 item 3.5.2.2.2.2 (1) relates to loss of material and cracking due to freeze-thaw in below-grade inaccessible concrete areas of Groups 1-3, 5, and 7-9 structures. ASME Section XI, Subsection IWF is recommended to manage the aging effect. Further evaluation of this aging effect is recommended only for structure / aging effect combinations that are not within the ASME Section XI, Subsection IWF or structures monitoring program.

The VEGP AMR results conclude that freeze-thaw is not significant at VEGP. The basis for this conclusion in structures other than containment is the same as the basis for the Containment Building. See Section 3.5.2.2.1.9, which provides discussion related to freeze-thaw effects for all VEGP concrete structures within the scope of license renewal.

(2) Cracking due to expansion and reaction with aggregates

NUREG-1800 item 3.5.2.2.2.2 (2) relates to cracking due to expansion and reaction with aggregates in below-grade inaccessible concrete areas of Groups 1-5, and 7-9 structures. Further evaluation is recommended if the concrete was not constructed in accordance with the recommendations in ACI 201.2R.

The VEGP AMR results conclude that cracking due to expansion and reaction with aggregates is not significant at VEGP. The basis for this conclusion in structures other than containment is the same as the basis for the Containment Building. See Section 3.5.2.2.1.10, which provides discussion related to concrete expansion and aggregate reactions for all VEGP concrete structures within the scope of license renewal.

(3) Cracking and distortion due to increased stress levels from settlement and; Reduction in foundation strength, cracking, differential settlement

NUREG-1800 indicates that cracks and distortion due to increased stress levels from settlement and reduction of foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations could occur in below-grade inaccessible concrete areas of Groups 1-3, 5 and 7-9 structures. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. Otherwise, no further evaluation is required if this activity is included in the scope of the Structures Monitoring Program.

The VEGP AMR results conclude that cracking and distortion due to increased stress levels from settlement is not significant at VEGP. The basis for this conclusion in structures other than containment is the same as the basis for the Containment Building. See Section 3.5.2.2.1.2, which provides discussion, related to cracking and distortion due to increased stress levels for all VEGP concrete structures within the scope of license renewal.

(4) Aggressive chemical attack and corrosion of embedded steel

Further evaluation is recommended by NUREG-1801 for aging management of inaccessible concrete areas exposed to an aggressive environment. Possible aging effects are increases in porosity and permeability, cracking, and loss of material due to aggressive chemical attack and cracking, loss of bond, and loss of material due to corrosion of embedded steel. Periodic monitoring of below-grade water chemistry is recommended as an acceptable approach to demonstrate that the below-grade environment is not aggressive.

Aggressive chemical attack is not applicable to VEGP. Reinforced concrete structures at VEGP were designed, constructed, and inspected in accordance with applicable ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete. The mixes were designed with entrained air content between 3% and 6%, and the concrete slumps were controlled throughout the batching, mixing, and placement processes. Crack control was achieved through proper sizing, spacing, and distribution of reinforcing steel in accordance with ACI 318-71. Groundwater analyses conducted at VEGP confirm that the groundwater is not aggressive.

Corrosion of embedded steel is conservatively assumed to be applicable at VEGP since embedded plates that are exposed to humid air and outdoor conditions may be susceptible to corrosion. Other component locations, such as steel reinforcement (rebar) and steel inserts are protected by the surrounding concrete. VEGP concrete structures and structural members were designed and constructed in accordance with ACI and ASTM standards which provide a good quality, dense, low permeability concrete that provides adequate concrete cover over the embedded steel. The concrete at VEGP is not exposed to aggressive groundwater. These factors are likely to prevent significant corrosion. However, inspections performed in accordance with Inservice Inspection Program - IWL and the Structural Monitoring Program are conservatively credited to detect any visible corrosion.

(5) Leaching of Calcium Hydroxide

NUREG-1800 indicates that further evaluation is recommended to address increases in porosity and permeability due to leaching of calcium hydroxide in below-grade inaccessible concrete areas in Groups 1-3, 5, and 7-9 structures. An aging management program is recommended only if the concrete was not constructed in accordance with the recommendations in ACI 201.2R. Otherwise, an aging management program is recommended.

The VEGP AMR results conservatively include increases in porosity and permeability due to leaching of calcium hydroxide. The basis for this conclusion in structures other than containment is the same as the basis for the Containment Building. See Section 3.5.2.2.1.10, which provides discussion related to leaching of calcium hydroxide for all VEGP concrete structures within the scope of license renewal.

3.5.2.2.2.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

NUREG-1800 item 3.5.2.2.2.3 relates to reduction of strength and modulus of concrete due to elevated temperatures in Group 1-5 concrete structures. For any concrete elements that exceed 150 °F for general areas and 200°F for local areas, further evaluation and implementation of a plant-specific program is recommended.

With the exception of small localized areas in the Auxiliary Building, all VEGP structures within the scope of license renewal remain at temperatures less than 150 ^{O}F. There are small localized areas in level B of the Auxiliary Building where the maximum assumed temperature could at times possibly reach 155^{O}F (per VEGP UFSAR Table 3.11.B.1-1). This room does not contain any safety-related equipment/ instrumentation. These are local areas where the maximum assumed temperatures are conservatively determined values and actual temperatures of the areas are lower. In summary, temperatures in Group 1-5 concrete structures do not exceed 150 °F for general areas and 200°F for local areas and therefore no additional aging management is warranted.

3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures

NUREG-1800 item 3.5.2.2.2.4 relates to evaluation of inaccessible concrete areas of Group 6 structures due to 1) aggressive chemical attack and corrosion of embedded steel; 2) freeze-thaw; and 3) leaching of calcium hydroxide.

Group 6 structures are described as water control structures in NUREG-1801, therefore this item is not applicable to VEGP. The VEGP design does not include any Group 6 water control structures in the scope of license renewal. Refer to the VEGP position on Regulatory Guide 1.127 in UFSAR Section 1.9.127.

3.5.2.2.2.5 Cracking due to Stress Corrosion Cracking and Loss of Material due to Pitting and Crevice Corrosion

NUREG-1800 item 3.5.2.2.2.5 relates to cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion for Group 7 and 8 stainless steel tank liners exposed to standing water.

VEGP uses stainless steel tank liners for the Refueling Water Storage Tanks, Reactor Makeup Water Storage Tanks, and Condensate Storage Tanks. Tank liners are evaluated with their respective mechanical systems. AMR results for these liners are presented in Tables 3.2.2-2, 3.3.2-26, and 3.4.2-4 for the Refueling Water Storage Tanks, Reactor Makeup Water Storage Tanks, and Condensate Storage Tanks, respectively.

3.5.2.2.2.6 Aging of Supports Not Covered by Structural Monitoring Program

NUREG-1800 item 3.5.2.2.2.6 relates to further evaluation of certain component support/aging effect combinations if they are not covered by the Structural Monitoring Program. This includes (1) loss of material due to general and pitting corrosion associated with Groups B2-B5 supports; (2) reduction in concrete anchor capacity due to degradation of the surrounding concrete associated with Groups B1-B5 supports; and (3) reduction/loss of isolation function due to degradation of vibration isolation elements associated with Group B4 supports.

For items (1) through (3), the VEGP responses are shown below:

(1) Consistent with NUREG-1800, VEGP manages loss of material due to corrosion in Groups B2-B5 supports with the Structural Monitoring Program.

(2) Consistent with NUREG-1800, VEGP manages reduction in concrete anchor capacity due to degradation of the surrounding concrete with the Structural Monitoring Program.

(3) This item is not applicable to VEGP. VEGP does not have any supports with vibration isolation elements which require AMR. The vibration isolation elements identified by the VEGP integrated plant assessment were determined to be integral parts of active equipment.

3.5.2.2.2.7 Cumulative Fatigue Damage due to Cyclic Loading

NUREG-1800 item 3.5.2.2.2.7 relates to cumulative fatigue damage due to cyclic loading for Groups B1.1, B1.2, and B1.3 component supports. If a TLAA, as defined in 10 CFR 54.3, exists then the TLAA should be evaluated in accordance with 10 CFR 54.21(c).

The results of VEGP reviews conducted to identify TLAAs in the current licensing basis did not include any fatigue analyses for component support members, anchor bolts, welds, etc.

3.5.2.2.3 *Quality Assurance for Aging Management of Nonsafety-Related Components*

Quality Assurance Program and Administrative Controls are discussed in Appendix B Section B.1.3.

3.5.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAAs identified below are associated with the Containment systems components.

- Concrete Containment Tendon Prestress (Section 4.5)
- Penetration Load Cycles (Section 4.6)

3.5.3 CONCLUSION

The Structures and Component Supports subject to aging management review have been identified in accordance with the scoping criteria of 10 CFR 54.4. Aging effects have been identified based on plant and industry operating experience as well as industry literature. Programs to manage these aging effects have been identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with the Structures and Component Supports are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
PWR Concrete (Reinforced and Prestressed) and Steel Containment BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment					
3.5.1-1	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) 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, plant-specific, if the environment is aggressive (See subsection 3.5.2.2.1.1)	VEGP manages accessible and inaccessible concrete components due to corrosion of embedded steel with the Inservice Inspection Program - IWE (Appendix B.3.30). Aggressive chemical attack is not an applicable aging effect requiring management for VEGP. See Section 3.5.2.2.1.1 for further discussion.
3.5.1-2	Concrete elements; All	Cracks and distortion due to increased stress levels from settlement	Structural Monitoring Program. 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 Structural Monitoring Program or a de-watering system is relied upon (See subsection 3.5.2.2.1.2)	VEGP does not rely on a dewatering system for control of settlement . Cracking and distortion due to increased stress levels from settlement is not an aging effect requiring management. However, VEGP structures are monitored for settlement as a part of the Structural Monitoring Program. See Section 3.5.2.2.1.2 for further details.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-3	Concrete elements: foundation, sub-foundation	Reduction in foundation strength, Cracking differential settlement due to erosion of porous concrete subfoundation	Structural Monitoring Program 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 Structural Monitoring Program or a de-watering system is relied upon (See subsection 3.5.2.2.1.2)	Reduction in foundation strength, cracking, and differential settlement due to erosion of porous concrete subfoundations is not an aging effect requiring management for the VEGP Containment Structure. See Section 3.5.2.2.1.2 for further details.
3.5.1-4	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, plant-specific if temperature limits are exceeded (See subsection 3.5.2.2.1.3)	This item is not applicable to VEGP. No containment components exceed the specified temperature thresholds. See Section 3.5.2.2.1.3 for further discussion.
3.5.1-5	BWR Only				

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-6	Steel elements: steel liner, liner anchors, integral attachments	Loss of material due to general, pitting and crevice corrosion	ISI (IWE), and 10 CFR Part 50, Appendix J.	Yes, if corrosion is significant for inaccessible areas (See subsection 3.5.2.2.1.4)	Consistent with NUREG-1801. VEGP manages loss of material with the Inservice Inspection Program - IWE (Appendix B.3.30) and the 10 CFR 50 Appendix J Program (Appendix B.3.29). Loss of material due to corrosion is not expected to be significant for inaccessible areas. See Section 3.5.2.2.1.4 for further discussion.
3.5.1-7	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 (See subsection 3.5.2.2.1.5)	VEGP Containment tendon prestress is addressed as a TLAA. See Section 3.5.2.2.1.5 for further discussion.
3.5.1-8	BWR Only				
3.5.1-9	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 (See subsection 3.5.2.2.1.6)	Consistent with NUREG-1801 for VEGP containment penetrations that experience significant cyclic loading. See Section 3.5.2.2.1.6 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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) and 10 CFR Part 50, Appendix J, and additional appropriate examinations/evaluations for bellows assemblies and dissimilar metal welds.	Yes, detection of aging effects is to be evaluated (See subsection 3.5.2.2.1.7)	Cracking due to stress corrosion cracking is not an aging effect requiring management for these stainless steel components. See Section 3.5.2.2.1.7 for further discussion.
3.5.1-11	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) and 10 CFR Part 50, Appendix J supplemented to detect fine cracks	Yes, detection of aging effects is to be evaluated (See subsection 3.5.2.2.1.8)	This item is not applicable to VEGP. Cracking due to cyclic loading is not an aging effect requiring management for the VEGP penetration elements. See Section 3.5.2.2.1.8 for further discussion.
3.5.1-13	BWR Only				

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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). Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions (See subsection 3.5.2.2.1.9)	Loss of material due to freeze-thaw effects is not an aging effect requiring management for VEGP. See Section 3.5.2.2.1.9 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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) 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 (See subsection 3.5.2.2.1.10)	The VEGP AMR results conclude that cracking due to expansion and reaction with aggregate is not an aging mechanism requiring management for the containment structure at VEGP. Concrete was constructed equivalent to recommendations in ACI 201.2R. VEGP manages loss of material due to leaching of calcium hydroxide with the Inservice Inspection Program - IWL (Appendix B.3.31). See Section 3.5.2.2.1.10 for further discussion.
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) and 10 CFR Part 50, Appendix J.	No	Consistent with NUREG-1801. VEGP manages loss of sealing with the Inservice Inspection Program - IWE (Appendix B.3.30) and the 10 CFR 50 Appendix J Program (Appendix B.3.29).

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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 and Plant Technical Specifications	No	The VEGP 10 CFR 50 Appendix J Program (Appendix B.3.29) manages any loss of leak tightness in closed position. Loss of material due to 'wear' has not been identified at VEGP. Operation of the hatches and airlocks is governed by VEGP Technical Specifications. Reviews of plant operational experience did not identify any mechanical wear issues resulting in loss of leak tightness. Locks, hinges, and closure mechanisms for the containment hatches and airlocks are active components and operated infrequently. Therefore, mechanical wear is not considered to be an aging mechanism that results in an aging effect requiring management.
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) and 10 CFR Part 50, Appendix J.	No	Consistent with NUREG-1801. The VEGP Inservice Inspection Program (IWE) (Appendix B.3.30) and 10 CFR 50 Appendix J Program (Appendix B.3.29) manage loss of material due to corrosion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-19	BWR Only				
3.5.1-20	BWR Only				
3.5.1-21	BWR Only				
3.5.1-22	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion	ISI (IWL)	No	Consistent with NUREG-1801. The VEGP Inservice Inspection Program (IWL) (Appendix B.3.31) will manage loss of material due to corrosion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
Safety-Related and Other Structures; and Component Supports					
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	Structural Monitoring Program	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.1)	Consistent with NUREG-1801. VEGP manages the aging effects with the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.1 for further discussion.
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	Structural Monitoring Program	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.1)	The VEGP AMR results conclude that the VEGP groundwater is not aggressive, therefore, aggressive chemical attack is not applicable to VEGP. Since the environment is not aggressive, no further evaluation is required. Nonetheless, all VEGP structural components will be monitored by the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.2.1 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-25	All Groups except Group 6: steel components: all structural steel	Loss of material due to corrosion	Structural Monitoring Program. If protective coatings are relied upon to manage the effects of aging, the Structural Monitoring Program is to include provisions to address protective coating monitoring and maintenance.	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.1)	Consistent with NUREG-1801. VEGP manages corrosion of steel components with the Structural Monitoring Program (Appendix B.3.32). In addition to the Structural Monitoring Program, the Boric Acid Corrosion Control Program is used to manage corrosion caused by leakage of borated water onto carbon steel components. Protective coatings are not credited for aging management of steel components. See Section 3.5.2.2.2.2(4) for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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	Structural Monitoring Program. 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 Structural Monitoring Program (See subsection 3.5.2.2.2.1) or for inaccessible areas of plants located in moderate to severe weathering conditions (See subsection 3.5.2.2.2.1)	This item is not applicable to VEGP. The VEGP AMR results conclude that freeze-thaw is not significant for VEGP. Nonetheless, all VEGP structural components applicable to this item will be monitored by the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.2.2(1) for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-27	All Groups except Group 6: accessible and inaccessible interior/exterior concrete	Cracking due to expansion due to reaction with aggregates	Structural Monitoring Program. None for inaccessible areas if concrete was constructed in accordance with the recommendations in ACI 201.2R-77.	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.1) or concrete was not constructed as stated for inaccessible areas (See subsection 3.5.2.2.2.2)	This item is not applicable to VEGP. The VEGP AMR results conclude that reaction with aggregates is not significant for VEGP. VEGP concrete was constructed consistent with the recommendations of ACI 201.2R. Nonetheless, all VEGP structural components applicable to this item will be monitored by the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.2.2(2) for further discussion.
3.5.1-28	Groups 1-3, 5-9: All	Cracks and distortion due to increased stress levels from settlement	Structural Monitoring Program. 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 Structural Monitoring Program (See subsection 3.5.2.2.2.1) or a de-watering system is relied upon (See subsection 3.5.2.2.2.3)	This item is not applicable to VEGP. The VEGP AMR results conclude that settlement is not significant for VEGP. Further, a dewatering system is not relied upon for control of settlement at VEGP. See Section 3.5.2.2.2.2(3) for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-29	Groups 1-3, 5-9: foundation	Reduction in foundation strength, Cracking differential settlement due to erosion of porous concrete subfoundation	Structural Monitoring Program. 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 Structural Monitoring Program (See subsection 3.5.2.2.2.1) or a de-watering system is relied upon (See subsection 3.5.2.2.2.3)	This item is not applicable to VEGP. The VEGP AMR results conclude that erosion of porous concrete subfoundations is not applicable to VEGP Structures. Further, a dewatering system is not relied upon for control of settlement at VEGP. See Section 3.5.2.2.2.2(3) for further discussion.
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	ISI (IWF) or Structural Monitoring Program	Yes, if not within the scope of ISI or Structural Monitoring Program (See subsection 3.5.2.2.2.1)	Lubrite® plates are not utilized on the RPV or steam generator supports. While Lubrite® plates have been used in pipe whip restraint and other pipe supports at VEGP, the VEGP AMR results conclude that wear is not applicable for VEGP. See Section 3.5.2.2.2.1 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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; Cracking loss of bond, and loss of material (spalling, scaling)/ corrosion of embedded steel	Structural Monitoring Program; 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, plant-specific, if environment is aggressive (See subsection 3.5.2.2.2.2.4)	The VEGP Structural Monitoring Program (Appendix B.3.32) will manage degradation of accessible and inaccessible concrete components due to corrosion of embedded steel. The VEGP AMR results conclude that the VEGP groundwater is not aggressive, therefore, aggressive chemical attack is not applicable to VEGP. Since the environment is not aggressive, no further evaluation is required. See Section 3.5.2.2.2.2(4) for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Structural Monitoring Program 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 (See subsection 3.5.2.2.2.2.5)	Consistent with NUREG-1801. VEGP conservatively considers leaching of calcium hydroxide to be applicable. All structure components applicable to this summary item will be monitored by the Structural Monitoring Program (Appendix B.3.32) VEGP concrete was constructed equivalent to the recommendations in ACI 201.2R. See Section 3.5.2.2.2.2(5) for further 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, plant-specific if temperature limits are exceeded (See subsection 3.5.2.2.2.3)	This item is not applicable to VEGP. VEGP concrete components do not exceed the temperature limits specified in NUREG-1800. See Section 3.5.2.2.2.3 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 or FERC/US Army Corps of Engineers dam inspections and maintenance programs 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, plant-specific if environment is aggressive (See subsection 3.5.2.2.2.4.1)	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure. See Section 3.5.2.2.2.4 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 or FERC/US Army Corps of Engineers dam inspections and maintenance programs. Evaluation is needed for plants that are located in moderate to severe weathering conditions (weathering index >100 day-inch/yr) (NUREG-1557).	Yes, for inaccessible areas of plants located in moderate to severe weathering conditions (See subsection 3.5.2.2.2.4.2)	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure. See Section 3.5.2.2.2.4 for further discussion.
3.5.1-36	Group 6: all accessible/ inaccessible reinforced concrete	Cracking due to expansion/ reaction with aggregates	Accessible areas: Inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspections and maintenance programs. 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 (See subsection 3.5.2.2.2.4.3)	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure. See Section 3.5.2.2.2.4 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	For accessible areas, inspection of Water-Control Structures or FERC/US Army Corps of Engineers dam inspections and maintenance programs. 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 (See subsection 3.5.2.2.2.4.3)	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure. See Section 3.5.2.2.2.4 for further discussion.
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, plant specific (See subsection 3.5.2.2.2.5)	Tank liners are evaluated under the mechanical scoping and AMR results. See Section 3.5.2.2.2.5 for further discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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	Structural Monitoring Program	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.6)	Consistent with NUREG-1801. VEGP manages the aging effect with the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.2.6(1) for additional discussion.
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	Structural Monitoring Program	Yes, if not within the scope of the applicant's Structural Monitoring Program (See Subsection 3.5.2.2.2.6)	Consistent with NUREG-1801. VEGP manages the aging effect with the Structural Monitoring Program (Appendix B.3.32). See Section 3.5.2.2.2.6(2) for additional discussion.
3.5.1-41	Vibration isolation elements	Reduction or loss of isolation function/ radiation hardening, temperature, humidity, sustained vibratory loading	Structural Monitoring Program	Yes, if not within the scope of the applicant's Structural Monitoring Program (See subsection 3.5.2.2.2.6)	This item is not applicable to VEGP. VEGP does not have any supports with vibration isolation elements which require AMR. See Section 3.5.2.2.2.6(3) for additional discussion.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 (See subsection 3.5.2.2.2.7)	This item is not applicable to VEGP. VEGP does not have any CLB fatigue analyses for support members, anchor bolts, or welds. See Section 3.5.2.2.2.7 for further 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	No	Consistent with NUREG-1801. The VEGP Category I structures do not include any masonry walls. However, certain access openings in the Auxiliary Building are sealed with concrete masonry units for radiation shielding and maintenance purposes. These concrete masonry units are included in this line item. VEGP manages cracking of masonry block walls and masonry units with the Structural Monitoring Program – Masonry Walls (Appendix B.3.33). For Masonry Fire Barriers, the Fire Protection Program (Appendix B.3.9) supplements the Structural Monitoring Program – Masonry Walls.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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)	Structural Monitoring Program	No	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure.
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 or FERC/US Army Corps of Engineers dam inspections and maintenance	No	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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 and monitoring of spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels.	No	The VEGP AMR results for the spent fuel pool, refueling cavity, and transfer canal liners and for the fuel transfer tube are compared to this item. VEGP manages loss of material due to localized corrosion with the Water Chemistry Control Program (Appendix B.3.28). The spent fuel pool water level, and the refueling cavity water level during core alterations, are monitored in accordance with the technical specifications. Leakage from the spent fuel pool leak chase channels is also monitored. The VEGP AMR results conclude that cracking due to SCC is not an aging effect requiring management for the reactor cavity or spent fuel pool liners. These liners are not exposed to borated water exceeding the 140°F threshold for onset of SCC. At low temperatures, loss of material due to localized corrosion is expected to be the dominant corrosion mechanism.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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 or FERC/US Army Corps of Engineers dam inspections and maintenance. If protective coatings are relied upon to manage aging, protective coating monitoring and maintenance provisions should be included.	No	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure.
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 or FERC/US Army Corps of Engineers dam inspections and maintenance programs	No	This item is not applicable to VEGP. The VEGP design does not include a Group 6 water control structure.
3.5.1-49	BWR Only				

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Structural Monitoring Program	No	Different than NUREG-1801. The VEGP AMR results aligning to this item include only aluminum conduit exposed to the air – outdoor environment. The VEGP AMR results for the aluminum conduit exposed to air-outdoor conclude that loss of material due to corrosion is not an aging effect requiring management.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	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	No	VEGP manages loss of material due to general corrosion with the plant specific Inservice Inspection Program – IWF (Appendix B.3.13). For cracking due to SCC, the VEGP AMR results conclude that cracking due to SCC is not an aging effect requiring management for high strength bolts associated with NSSS component supports. VEGP bases this conclusion on three factors: First, none of the bolting materials used have minimum specified yield strengths exceeding 150 ksi. Second, the normal operating conditions for these fasteners does not include significant or prolonged wetting, nor the presence of significant concentrations of detrimental chemical species.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.5.1-51 (cont'd)	Group B1.1: high strength low-alloy bolts	Cracking due to stress corrosion cracking; loss of material due to general corrosion	Bolting Integrity	No	Third, reviews of VEGP operating experience failed to identify any occurrences of SCC in high strength structural bolting. Throughout the industry, SCC of bolts with specified minimum yield strengths less than 150 ksi have been predominantly associated with either boric acid wastage, which is addressed by the VEGP Boric Acid Corrosion Control Program, or with overly hard fasteners. Therefore VEGP concludes that cracking due to SCC is not an aging effect requiring management for threaded fasteners.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Structural Monitoring Program	No	Different than NUREG-1801. The VEGP AMR results do not include loss of mechanical function as an aging effect requiring management for these components. VEGP does not consider loss of mechanical function to be an aging effect requiring management. Loss of mechanical function due to distortion, dirt, overload, and fatigue due to vibratory and cyclic thermal loads are typically the result of inadequate design or specific events, rather than long term degradation. However, loss of material due to corrosion, which could cause a loss of mechanical function, has been identified as aging effect requiring management and is addressed by summary Item 3.5.1-53.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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)	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Structural Monitoring Program (Appendix B.3.32) and VEGP Inservice Inspection Program (IWF) (Appendix B.3.13).

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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)	No	Different than NUREG-1801. The VEGP AMR results do not include loss of mechanical function as an aging effect requiring management for these components. VEGP does not consider loss of mechanical function to be an aging effect requiring management. Loss of mechanical function due to distortion, dirt, overload, and fatigue due to vibratory and cyclic thermal loads are typically the result of inadequate design or specific events, rather than long term degradation. However, loss of material due to corrosion, which could cause a loss of mechanical function, has been identified as aging effect requiring management and is addressed by summary item 3.5.1-53.
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	No	Consistent with NUREG-1801. VEGP manages the aging effect with the Boric Acid Corrosion Control Program (Appendix B.3.3).

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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)	No	Different than NUREG-1801. The VEGP AMR results do not include loss of mechanical function as an aging effect requiring management for these components. This conclusion is based on VEGP plant-specific operating experience. Further, industry experience has shown that Lubrite® materials are designed to resist deformation, have a low coefficient of friction, resist softening at elevated temperatures, resist corrosion, withstand high radiation fields, and do not score or mar.
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)	No	This item is not applicable to VEGP. The VEGP AMR results do not include any supports with vibration isolation elements. The vibration isolation elements identified by the VEGP integrated plant assessment were determined to be integral parts of active equipment.

Table 3.5.1 (cont'd) Summary of Aging Management Evaluations for Structures and Component Supports in Chapters II and III of NUREG-1801

Item Number	Component	Aging Effect / Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	None - No AEM or AMP	Consistent with NUREG-1801.
3.5.1-59	Stainless steel support members; welds; bolted connections; support anchorage to building structure	None	None	None - No AEM or AMP	Consistent with NUREG-1801.

Table 3.5.2-1 Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Above Grade - Dome; wall; buttresses	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support	Concrete	Air - Indoor Air - Outdoor	Cracking Loss of Material	Inservice Inspection Program - IWL	II.A1-7	3.5.1-1	E 509
2	Concrete : Below Grade - wall; buttresses	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support	Concrete	Air - Indoor Air - Outdoor	Cracking Loss of Material	Inservice Inspection Program - IWL	II.A1-7	3.5.1-1	E 509
				Soil	Change in Material Properties	Inservice Inspection Program - IWL	II.A1-6	3.5.1-15	E 510
					Cracking Loss of Material	Inservice Inspection Program - IWL	II.A1-7	3.5.1-1	E 509

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
3	Concrete: Foundation; subfoundation	Heat Sink Missile Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support	Concrete	Air – Indoor	Cracking Loss of Material	Inservice Inspection Program - IWL	II.A1-7	3.5.1-1	E 509
				Soil	Change in Material Properties	Inservice Inspection Program - IWL	II.A1-6	3.5.1-15	E 510
					Cracking Loss of Material	Inservice Inspection Program - IWL	II.A1-7	3.5.1-1	E 509
4	Concrete: Internal Structures	Heat Sink Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A4-3	3.5.1-23	A 509
5	Concrete: Internal Structures – HVAC Duct	Flow Direction Structural Support	Concrete	Air - Indoor	Cracking	Structural Monitoring Program	III.A4-3	3.5.1-23	C 509

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
6	Penetration with Bellows - Fuel Transfer Tube Assemblies	Pressure Boundary Shelter / Protection	Stainless Steel	Air - Indoor	None	None Required	III.B1.1-9	3.5.1-59	C 507
				Borated Water	Loss of Material	Water Chemistry Control Program	III.A5-13	3.5.1-46	C 506 515
		Structural Support	Steel	Air -Indoor	Loss of Material	10 CFR 50 Appendix J Program	II.A3-1	3.5.1-18	C 507
						Inservice Inspection Program - IWE	II.A3-1	3.5.1-18	E 507
7	Penetrations (Containment Boundary)	Pressure Boundary	Stainless Steel	Air - Indoor	None	None Required	II.A3-2	3.5.1-10	I 506
		Structural Support	Steel	Air – Indoor Air - Outdoor	Loss of Material	10 CFR 50 Appendix J Program	II.A3-1	3.5.1-18	C
						Inservice Inspection Program - IWE	II.A3-1	3.5.1-18	E 507

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
8	Personnel Airlock and Equipment Hatches	Missile Barrier Pressure Boundary Radiation Shielding	Steel	Air - Indoor	Loss of Material	10 CFR 50 Appendix J Program	II.A3-6	3.5.1-18	A
						Inservice Inspection Program –IWE	II.A3-6	3.5.1-18	E
9	Prestressing System: Tendons; Anchorage Components	Structural Support	Steel	Air - Outdoor	Loss of Material	Inservice Inspection Program - IWL	II.A1-10	3.5.1-22	E
10	Seals, Gaskets and Moisture Barriers	Pressure Boundary Radiation Shielding	Elastomer	Air - Indoor	Loss of Sealing	10 CFR 50 Appendix J Program	II.A3-7	3.5.1-16	A
						Inservice Inspection Program - IWE	II.A3-7	3.5.1-16	E
11	Steel Components: All structural steel	Shelter / Protection Structural Support	Steel	Air with Borated Water Leakage	Loss of Material – Boric Acid Corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C
				Air - Indoor	Loss of Material	Structural Monitoring Program	III.A4-5	3.5.1-25	A

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
12	Steel Components: Emergency Sump Screens (ECCS & Ctmt Spray)	Debris Protection Structural Support	Stainless Steel	Air - Indoor	None	None Required	III.B2-8	3.5.1-59	A
13	Steel Components: Integrated Reactor Head Steel Assemblies	Missile Barrier Shelter / Protection Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.A4-5	3.5.1-25	C
				Air with Borated Water Leakage	Loss of Material – Boric Acid Corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C
			Stainless Steel	Air - Indoor	None	None Required	III.B2-8	3.5.1-59	C

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
14	Steel Components: Liner (Containment); Liner Anchors; Integral Attachments	Pressure Boundary Structural Support	Steel	Air - Indoor	Loss of Material	Inservice Inspection Program – IWE	II.A1-11	3.5.1-6	E
						10 CFR 50 Appendix J Program	II.A1-11	3.5.1-6	A
				Air with Borated Water Leakage	Loss of Material - Boric Acid Corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C
15	Steel Components: Liner and Misc. Steel – Refueling Cavity & Transfer Canal	Pressure Boundary Shelter / Protection Structural Support Water Retention	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	III.A5-13	3.5.1-46	C 505 515

Table 3.5.2-1 (cont'd) Containment Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
16	Steel Components: Tri-Sodium Phosphate Basket	Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.A4-5	3.5.1-25	C
				Air with Borated Water Leakage	Loss of Material - Boric Acid Corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C 511

Table 3.5.2-2 Auxiliary, Control, Fuel Handling, and Equipment Buildings – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Indoor Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9 III.A5-9	3.5.1-23	A 509
2	Concrete: Exterior below grade	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7 III.A5-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4 III.A5-4	3.5.1-31	A 509
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7 III.A5-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4 III.A5-4	3.5.1-31	A 509

Table 3.5.2-2 (Cont'd) Auxiliary, Control, Fuel Handling, and Equipment Building – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
4	Concrete: Interior	Flood Barrier Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9 III.A5-9	3.5.1-23	A 509
5	Concrete: Roof slab	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9 III.A5-9	3.5.1-23	A 509
6	Masonry Walls: All	Radiation Shielding	Masonry Block	Air – Indoor	Cracking	Structural Monitoring Program – Masonry Walls	III.A3-11	3.5.1-43	A
7	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12 III.A5-12	3.5.1-25	A
				Air with Borated Water Leakage	Loss of Material - Boric Acid Corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C

Table 3.5.2-2 (Cont'd) Auxiliary, Control, Fuel Handling, and Equipment Building – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
8	Steel Components: Fuel Pool Gate	Shelter / Protection Structural Support Water Retention	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	III.A5-13	3.5.1-46	E 505 515
9	Steel Components: Spent Fuel Pool Liners	Shelter / Protection Structural Support Water Retention	Stainless Steel	Borated Water	Loss of Material	Water Chemistry Control Program	III.A5-13	3.5.1-46	E 505 515
10	Sump Liner Plate	Shelter / Protection	Stainless Steel	Air - Indoor	None	None Required	III.B2-8	3.5.1-59	C

Table 3.5.2-3 Emergency Diesel Generator Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete: Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
4	Concrete: Roof slab	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-3 (cont'd) Emergency Diesel Generator Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-4 Turbine Building – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete: Exterior below grade	Shelter / Protection Structural Support	Concrete	Soil	Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
					Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
4	Concrete: Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-4 (cont'd) Turbine Building – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
5	Concrete: Roof slab	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
6	Masonry Wall	Structural Support	Masonry Block	Air - Indoor	Cracking	Structural Monitoring Program – Masonry Walls	III.A3-11	3.5.1-43	A
7	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-5 Tunnels and Duct Banks – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete: Exterior below grade	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
4	Concrete: Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-5 (cont'd) Tunnels and Duct Banks – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-6 Nuclear Service Cooling Water Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Indoor Air – Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508
				Water Standing	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	C 510 508
2	Concrete: Exterior below grade	Shelter / Protection Structural Support	Concrete	Soil Water Standing	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	C 510 508
				Soil	Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	C 509 508

Table 3.5.2-6 (cont'd) Nuclear Service Cooling Water Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil Water Standing	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	C 510 508
				Soil	Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	C 508 509
H4	Concrete: Interior	Flood Barrier Shelter / Protection Structural Support	Concrete	Air – Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508
				Raw Water	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	G 510 508
					Cracking Loss of Material	Structural Monitoring Program	None	None	J 509 508

Table 3.5.2-6 (cont'd) Nuclear Service Cooling Water Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Concrete: Roof slab	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508
6	NSCW Cooling Tower Basin	Structural Support Water Retention	Concrete	Raw Water	Cracking Loss of Material	Structural Monitoring Program	None	None	J 509 508
					Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	G 510 508
				Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	C 510 508
					Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508

Table 3.5.2-6 (cont'd) Nuclear Service Cooling Water Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
7	NSCW Cooling Tower Drift Eliminator	Moisture Elimination	Asbestos Cement Board	Water - Flowing	Loss of Material - Erosion	Periodic Surveillance and Preventive Maintenance Activities	None	NA	J 508
8	NSCW Cooling Tower Fill Material	Flow Distribution Heat Sink	Asbestos cement Board	Water - Flowing	Loss of Material - Erosion	Periodic Surveillance and Preventive Maintenance Activities	None	None	J 508
9	NSCW Cooling Tower Stack	Flow Direction Shelter / Protection	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508
10	NSCW Cooling Tower Steel Structures	Structural Support	Steel Stainless Steel	Raw Water	Loss of Material	Structural Monitoring Program	III.A6-11 V.C-3	3.5.1-47	E 508
11	NSCW Cooling Tower Structure Above Grade	Structural Support Water Retention	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509 508

Table 3.5.2-6 (cont'd) Nuclear Service Cooling Water Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
12	Steel Components: All Structural steel	Shelter / Protection Structural Support	Steel	Air – Indoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	C 508
				Water Standing	Loss of Material	Structural Monitoring Program	III.A6-11	3.5.1-47	E 508
			Stainless Steel	Raw Water	Loss of Material	Structural Monitoring Program	V.C-3	None	E 508

Table 3.5.2-7 Concrete Tank and Valve House Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete: Exterior above grade	Flood Barrier Shelter / Protection Structural Support Missile Barrier	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A7-8	3.5.1-23	A 509
					Change in Material Properties	Structural Monitoring Program	III.A7-6	3.5.1-32	A 510
2	Concrete: Foundations	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A7-6	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A7-3	3.5.1-31	A 509
				Raw Water	Change in Material Properties	Structural Monitoring Program	III.A7-6	3.5.1-32	C 510
3	Concrete: Roof Slab	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A7-8	3.5.1-23	A 509

Table 3.5.2-7 (Cont'd) **Concrete Tank and Valve House Structures – Summary of Aging Management Review**

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
4	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor Air -Outdoor	Loss of Material	Structural Monitoring Program	III.A7-10	3.5.1-25	A
5	Tank Manways	Shelter / Protection Debris Protection	Stainless Steel	Air - Outdoor	None	None Required	III.B2-8	3.5.1-59	C

Table 3.5.2-8 Switchyard Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete : Exterior Above Grade	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete: Roof Slab	Shelter / Protection Structural Support	Concrete	Air -Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
4	Masonry Wall	Shelter / Protection	Masonry Block	Air - Indoor	Cracking	Structural Monitoring Program – Masonry Walls	III.A3-11	3.5.1-43	A
5	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-9 Fire Protection Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete : Exterior Above Grade	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete : Exterior Below Grade	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
4	Concrete : Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-9 (cont'd) Fire Protection Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Concrete: Roof Slab	Shelter / Protection Structural Support	Concrete	Air -Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
6	FWST Concrete: Foundation Beam	Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A8-6	3.5.1-32	C 510
					Cracking Loss of Material	Structural Monitoring Program	III.A8-3	3.5.1-31	C 509
7	FWST Hold Down Bolts	Structural Support	Steel	Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B3-7	3.5.1-39	C
8	Masonry Walls	Shelter / Protection Structural Support	Masonry Block	Air – Indoor Air - Outdoor	Cracking	Structural Monitoring Program – Masonry Walls	III.A3-11	3.5.1-43	C
9	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-10 Radwaste Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete : Exterior Above Grade	Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete : Exterior Below Grade	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
4	Concrete : Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-10 (Cont'd) Radwaste Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Concrete: Roof Slab	Shelter / Protection Structural Support	Concrete	Air -Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
6	Masonry Walls	Shelter / Protection Structural Support	Masonry Block	Air - Indoor	Cracking	Structural Monitoring Program – Masonry Walls	III.A3-11	3.5.1-43	A
7	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-11 Auxiliary Feedwater Pump House Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Concrete : Exterior Above Grade	Missile Barrier Shelter / Protection Structural Support	Concrete	Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
2	Concrete: Foundation	Shelter / Protection Structural Support	Concrete	Soil	Change in Material Properties	Structural Monitoring Program	III.A3-7	3.5.1-32	A 510
					Cracking Loss of Material	Structural Monitoring Program	III.A3-4	3.5.1-31	A 509
3	Concrete : Interior	Shelter / Protection Structural Support	Concrete	Air - Indoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509
4	Concrete: Roof Slab	Missile Barrier Shelter / Protection Structural Support	Concrete	Air -Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	A 509

Table 3.5.2-11 (Cont'd) Auxiliary Feedwater Pump House Structures – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Steel Components: All Structural Steel	Shelter / Protection Structural Support	Steel	Air - Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	A

Table 3.5.2-12 Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
1	Battery Racks	Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B3-7	3.5.1-39	C
2	Cable Tray	Shelter / Protection Structural Support	Aluminum	Air - Indoor	None	None Required	III.B1.1-6	3.5.1-58	C
			Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B2-10	3.5.1-39	C
3	Compressible Joints and Seals	Fire Barrier Flood Barrier Shelter/ Protection	Elastomer	Air – Indoor Air - Outdoor	Change in Material Properties Loss of Sealing	Structural Monitoring Program	III.A6-12	3.5.1-44	C
4	Concrete: Equipment Pads, Foundations, Pedestals	Structural Support	Concrete	Air – Indoor Air - Outdoor	Cracking Loss of Material	Structural Monitoring Program	III.A3-9	3.5.1-23	C 509

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
5	Concrete: Building Concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (ASME Piping and Component Supports)	Structural Support	Concrete	Air – Indoor	Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation	Structural Monitoring Program	III.B1.1-1 III.B1.2-1 III.B1.3-1	3.5.1-40	A
6	Concrete: Building Concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Cable Tray, Conduit, HVAC, Ducts, Tube Track, Instrument Tubing, Non-ASME Piping and Components)	Structural Support	Concrete	Air – Indoor	Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation	Structural Monitoring Program	III.B2-1	3.5.1-40	A

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
7	Concrete: Building Concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Concrete - Racks, Panels, etc.)	Structural Support	Concrete	Air – Indoor	Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation	Structural Monitoring Program	III.B3-1	3.5.1-40	A
8	Concrete: Building Concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (EDG, HVAC, Mech Eqpmt, etc.)	Structural Support	Concrete	Air – Indoor	Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation	Structural Monitoring Program	III.B4-1	3.5.1-40	A

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
9	Concrete: Building Concrete at supports - locations of expansion and grouted anchors; grout pads for support base plates (Platforms, PW Restraints, etc.)	Structural Support	Concrete	Air – Indoor	Reduction in Concrete Anchor Capacity Due to Local Concrete Degradation	Structural Monitoring Program	III.B5-1	3.5.1-40	A
10	Conduits	Shelter / Protection	Aluminum	Air – Indoor	None	None Required	III.B2-4	3.5.1-58	C
				Air - Outdoor			III.B2-7	3.5.1-50	I
			Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B2-10	3.5.1-39	C
11	Doors, Hatches (includes Flood, Pressure, and Specialty Doors)	Flood Barrier Missile Barrier Pressure Boundary Shelter / Protection	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	C
12	Fire Barrier – Radiant Energy Shields	Fire Barrier	Steel	Air - Indoor	Loss of Material	Fire Protection Program	VII.G-3	3.3.1-63	D 504

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
13	Fire Barrier – Structural Steel – with /sprayed-on or Trowelled -on Fire Resistive coatings	Fire Barrier	Cementitious (Fire Proofing)	Air - Indoor	None	None Required	None	None	F 512
			Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	F 512

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
14	Fire Boundaries: Concrete Elements and Plaster Walls (Includes Gypsum Board)	Fire Barrier	Concrete	Air - Indoor	Cracking	Fire Protection Program	VII.G-29	3.3.1-67	H 509
						Structural Monitoring Program	VII.G-29	3.3.1-67	H 509
					Loss of Material	Fire Protection Program and	VII.G-29	3.3.1-67	B 509
						Structural Monitoring Program	VII.G-29	3.3.1-67	A 509
			Gypsum	Air – Indoor	Cracking	Fire Protection Program and Structural Monitoring Program	None	None	J
15	Fire Boundaries: Masonry	Fire Barrier	Masonry Block	Air – Indoor	Cracking	Fire Protection Program	III.A3-11	3.5.1-43	D
						Structural Monitoring Program - Masonry Walls	III.A3-11	3.5.1-43	C

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
16	Fire Boundaries: Doors	Fire Barrier Shelter / Protection	Steel	Air – Indoor	Loss of Material	Fire Protection Program	VII.G-3	3.3.1-63	B 504
				Air - Outdoor	Loss of Material	Fire Protection Program	VII.G-4	3.3.1-63	B 504
17	Fire Barrier Assemblies	Fire Barrier	Fire Proofing Materials	Air – Indoor Air - Outdoor	Cracking Change in Material Properties Separation	Fire Protection Program	None	None	J 514
18	Fire-Boundary Penetration Seals, Seismic Gap Fire Seals	Fire Barrier	Elastomer	Air – Indoor	Cracking	Fire Protection Program	VII.G-1	3.3.1-61	B 503
				Air - Outdoor	Cracking	Fire Protection Program	VII.G-2	3.3.1-61	B 503
19	HELB Barriers (includes Jet Impingement Shields, Whip Restraint, etc.)	HE/ME Shielding Pipe Whip Restraint	Steel	Air – Indoor	Loss of Material	Structural Monitoring Program	III.B5-7	3.5.1-39	C
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B5-8	3.5.1-55	C

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
20	HVAC Louvers and Screens	Debris Protection	Steel	Air - Outdoor	Loss of Material	Structural Monitoring Program	III.A3-12	3.5.1-25	C
21	Miscellaneous cranes including Monorails	Structural Support	Steel	Air – Indoor	Loss of Materials	Structural Monitoring Program	VII.B-3	3.3.1-73	E
22	Missile Shields	Missile Barrier	Steel	Air – Indoor Air – Outdoor	Loss of Material	Structural Monitoring Program	III.B5-7	3.5.1-39	C
23	Penetration Seals (non-Fire Barrier)	Flood Barrier Pressure Boundary Shelter/ Protection	Elastomer	Air – Indoor	Cracking	Structural Monitoring Program	III.A6-12	3.5.1-44	C
24	Penetration Sleeves	Shelter/ Protection	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	II.A3-1	3.5.1-18	E
25	Plant Vent Stack	Flow Distribution Structural Support	Steel	Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B2-10	3.5.1-39	C

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
26	Platforms, Gratings, Stairways & Other Misc. Steel Structures	Shelter/ Protection Structural Support	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B5-7	3.5.1-39	C
27	Racks, Panels, Cabinets, Frames, & Enclosures.	Shelter / Protection	Aluminum	Air - Indoor	None	None Required	III.B3-2	3.5.1-58	A
			Stainless Steel	Air - Indoor	None	None Required	III.B3-5	3.5.1-59	A
			Steel	Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B3-8	3.5.1-55	A
				Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B3-7	3.5.1-39	A
28	Roof Membrane	Shelter/ Protection Structural Support	Elastomer	Air - Outdoor	Cracking	Structural Monitoring Program	III.A6-12	3.5.1-44	C 503

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
29	Steel Components – All Steel commodities	Structural Support	Stainless Steel	Air with Borated Water Leakage	None	None Required	III.B5-6	3.5.1-59	C
			Steel	Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B5-8	3.5.1-55	C
30	Supports - Sliding Surfaces	Structural Support	Lubrite®	Air - Indoor	None	None Required	III.B1.1-5	3.5.1-56	I
31	Supports for ASME Piping and Components (IWF scope): constant and variable load spring hangers; guides; stops	Structural Support	Steel	Air - Indoor	Loss of Material	Inservice Inspection Program (IWF)	III.B1.1-13 III.B1.2-10	3.5.1-53	E 502
				Air - Outdoor	Loss of Material	Inservice Inspection Program (IWF)	III.B1.1-13 III.B1.2-10	3.5.1-53	E 502
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
32	Supports for ASME Piping and Components (IWF scope): High Strength Bolting for NSSS Component Supports	Structural Support	Steel	Air - Indoor	Loss of Material	Inservice Inspection Program (IWF)	III.B1.1-4	3.5.1-51	E 502
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	C
33	Supports for ASME Piping and Components (IWF scope): Support members; welds; bolted connections; support anchorage to building Structure	Structural Support	Stainless Steel	Air - Indoor	None	None Required	III.B1.1-9	3.5.1-59	A
			Steel	Air - Indoor	Loss of Material	Inservice Inspection Program (IWF)	III.B1.1-13	3.5.1-53	E 502
			Steel	Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B1.1-14	3.5.1-55	A

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
34	Supports for Cable Tray, Conduit, HVAC Ducts, Tube Track, Instrument Tubing, Non-ASME Piping (i.e., not in IWF scope) and Components: Support Members; welds; bolted connections; support anchorage to building Structure	Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B2-10	3.5.1-39	A
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B2-11	3.5.1-55	A
35	Supports for EDGs, HVAC Components, and Misc. Mechanical Equipment: Support Members; welds; bolted connections; support anchorage to building Structure	Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B4-10	3.5.1-39	A
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B4-11	3.5.1-55	A

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
36	Supports for Missile Shields, welds; bolted connections; support anchorage to building Structure	Missile Barrier Structural Support	Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B5-7	3.5.1-39	C
37	Supports for Platforms, Pipe Whip Restraints, HELB Barriers, & Misc. Structures: Support members; welds; bolted connections; support anchorage to building Structure	Pipe Whip Restraint Shelter/ Protection Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B5-7	3.5.1-39	A
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B5-8	3.5.1-55	A
38	Supports for Racks, Panels, Cabinets, etc: Support members; welds; bolted connections; support anchorage to building Structure	Shelter/ Protection Structural Support	Aluminum	Air - Indoor	None	None Required	III.B3-2	3.5.1-58	A
			Stainless Steel	Air - Indoor	None	None Required	III.B3-5	3.5.1-59	A
			Steel	Air – Indoor Air - Outdoor	Loss of Material	Structural Monitoring Program	III.B3-7	3.5.1-39	A
				Air with Borated Water Leakage	Loss of Material – Boric Acid corrosion	Boric Acid Corrosion Control Program	III.B3-8	3.5.1-55	A

Table 3.5.2-12 (Cont'd) Component Supports and Bulk Commodities – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
39	Supports for RCS Primary Equipment (includes RPV, SG, Pressurizer, RCP)	Shelter/ Protection Structural Support	Steel	Air - Indoor	Loss of Material	Inservice Inspection Program (IWF)	III.B1.1-13	3.5.1-53	E 502
40	Tube Track	Shelter/ Protection Structural Support	Steel	Air - Indoor	Loss of Material	Structural Monitoring Program	III.B2-10	3.5.1-39	C

Standard Notes for containments, Structures, and Component Supports

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.

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

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

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

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

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

Plant Specific Notes for containments, Structures, and Component Supports

501 NUREG-1801 uses the term "Reduction of strength and modulus" as the aging effect in Concrete due to elevated temperature. The VEGP AMR process uses the term "Change in Material Properties" as the aging effect resulting from elevated temperature. These terms are essentially the same.

502 In addition to the Inservice Inspection Program – IWF, supports for ASME piping and components are also inspected by the Structural Monitoring Program.

503 Aging effect terminology used in GALL is different but is managed by the listed aging management program(s).

504 Aging effect matches with GALL but not aging mechanism.

505 The normal operating temperature for these components is below the 140 °F threshold for stress corrosion cracking.

506 The VEGP AMR process concluded that stainless steel materials in the containment penetration assemblies, including dissimilar metal welds and bellows, are not exposed to aggressive environments. Therefore, additional (augmented) examinations to detect cracking due to SCC in dissimilar metal welds and bellows are unnecessary. The containment penetrations are in an indoor air environment and are not subject to intermittent wetting in an aggressive environment. Portions of the fuel transfer tube assemblies are periodically wetted with borated water during refueling operations. However, VEGP does not consider this wetting to represent an aggressive environment since the VEGP Water chemistry Program controls contaminant levels and normal operating temperatures are below 140°F.

507 Thermal Insulation used on hot process pipes at containment boundary penetrations is included in scope under the mechanical systems review (under auxiliary systems). There is no additional insulation integral to the penetrations.

508 Nuclear Service Cooling Water Structure (NSCWS) is not a structure listed in NUREG 1801 (GALL). The NUREG-1801 item assigned to the AMR line item is intended to be the best match in GALL.

509 The VEGP AMR process conservatively concluded cracking and loss of material (spalling, scaling) of concrete due to the aging mechanism of "Corrosion of Embedded Steel" requires aging management.

510 The VEGP AMR process conservatively concluded change in material properties due to the aging mechanism of "Leaching of calcium Hydroxide" requires aging management.

511 Based on our review of the aging mechanism of boric acid corrosion was not specifically evaluated for this component type.

512 The sprayed-on or trowelled-on fire resistive material has no aging effects requiring aging management. In the course of inspecting the underlying steel surfaces by the Structural Monitoring Program, any degradation in the sprayed-on or trowelled-on coating would however be identified and remedied in accordance with the corrective action program described in LRA.

513 In addition to the ISI - IWF Program, supports and components are also inspected by the Structural Monitoring Program.

514 The “Fire Barrier Assemblies” component type includes materials such as maranite, ceramic, silicone foam, fiberboard.

515 The spent fuel pool water level, and the refueling cavity water level during core alterations, are monitored in accordance with the technical specifications. Leakage from the spent fuel pool leak chase channels is also monitored.

3.6 AGING MANAGEMENT OF ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) COMPONENTS

3.6.1 INTRODUCTION

Section 3.6 provides the results of the aging management reviews (AMRs) for those components/commodities identified in Section 2.5, Scoping and Screening Results – Electrical and Instrumentation and Control (I&C) Systems that require AMR. Consistent with the methods described in NEI 95-10, the electrical and I&C aging management reviews focus on commodity groups rather than systems. The following component types identified in Table 2.5.1 as requiring aging management review are addressed in this section:

- Cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.1)
- Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ Requirements (Section 2.5.5.3)
- Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.5)
- Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.6)
- Fuse Holders (Not part of a larger assembly): Insulation not subject to 10 CFR 50.49 EQ requirements (Section 2.5.5.7)
- Fuse Holders (Not part of a larger assembly): Metallic clamps (Section 2.5.5.8)
- High voltage insulators (Section 2.5.5.9)
- Switchyard bus and connections (Section 2.5.5.10)
- Transmission conductors and connections (Section 2.5.5.11)

Table 3.6.1, Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801, provides a summary comparison of the VEGP aging management activities with the aging management activities evaluated in NUREG-1801 for the component types that are relied on for license renewal. Text addressing summary items requiring further evaluation is provided in Section 3.6.2.2.

The format and usage of this table and the associated further evaluation text is described in Section 3.0.2.

3.6.2 RESULTS

The following table summarizes the results of the aging management reviews for electrical components:

Table 3.6.2-1, Electrical Components – Summary of Aging Management Review

The materials of construction, service environments, aging effects requiring management, and credited aging management programs are provided for each of the component types in Section 3.6.2.1. The service environments used in the electrical aging management reviews are described in Table 3.0-3.

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

3.6.2.1.1 *Cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements*

Materials

Cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are constructed of the following materials:

- Various metals used for electrical contacts

Environments

Cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are exposed to the following environments:

- Air – indoor and outdoor

Aging Effects Requiring Management

The following aging effects associated with cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements require management:

- Loosening of bolted connections

Aging Management Programs

The following aging management programs are applied to cable connections (metallic parts) not subject to 10 CFR 50.49 EQ requirements:

- Non-EQ Cable Connections One-Time Inspection Program (Appendix B.3.36)

3.6.2.1.2 *Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements*

Materials

Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are constructed of the following components:

- Various organic polymers (e.g., EPR, SR, EPDM, XLPE)

Environments

Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are exposed to the following environments:

- Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen

Aging Effects Requiring Management

The following aging effects associated with conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements require management:

- Reduced insulation resistance

Aging Management Programs

The following aging management programs are applied to conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements:

- Non-EQ Cables and Connections Program (Appendix B.3.34)

3.6.2.1.3 *Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements*

Materials

Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are constructed of the following components:

- Various organic polymers (e.g., EPR, SR, EPDM, XLPE)

Environments

Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are exposed to the following environments:

- Adverse localized environment caused by exposure to moisture and voltage

Aging Effects Requiring Management

The following aging effects associated with conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements require management:

- Localized damage and breakdown of insulation

Aging Management Programs

The following aging management programs are applied to conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements:

- Non-EQ Inaccessible Medium-Voltage Cables Program (Appendix B.3.35)

3.6.2.1.4 *Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements*

Materials

Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are constructed of the following components:

- Various metals used for electrical contacts

Environments

Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements requiring an aging management review are exposed to the following environments:

- Air with borated water leakage

Aging Effects Requiring Management

The following aging effects associated with connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements require management:

- Corrosion of connector contact surfaces

Aging Management Programs

The following aging management programs are applied to connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements:

- Boric Acid Corrosion Control Program (Appendix B.3.3)

3.6.2.1.5 *Fuse Holders (Not part of a larger assembly): Insulation not subject to 10 CFR 50.49 EQ requirements*

Materials

The insulation in fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 EQ requirements, and are subject to aging management review, are constructed of the following components:

- Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other

Environments

The insulation in fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 EQ requirements, and are subject to aging management review, are exposed to the following environments:

- Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen
- Air – indoor

Aging Effects Requiring Management

The following aging effects requiring management are associated with insulation in fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 EQ requirements, and are subject to aging management review:

- For adverse localized environments caused by heat, radiation, or moisture in the presence of oxygen, the following aging effects require management: Reduced insulation resistance
- For an air – indoor environment, the following aging effects require management: None

Aging Management Programs

The following aging management programs are applied to the insulation in fuse holders that are not part of a larger assembly and not subject to 10 CFR 50.49 EQ requirements:

- Non-EQ Cables and Connections Program (Appendix B.3.34)

3.6.2.1.6 *Fuse Holders (Not part of a larger assembly): Metallic clamps*

Materials

The metallic clamps of fuse holders that are not part of a larger assembly and subject to aging management review are constructed of the following components:

- Copper alloy

Environments

The metallic clamps of fuse holders that are not part of a larger assembly and subject to aging management review are exposed to the following environments:

- Air – indoor

Aging Effects Requiring Management

The following aging effects are associated with the metallic clamps of fuse holders that are not part of a larger assembly and are subject to aging management review:

- None

The aging management review determined that the aging effects are not significant and that no aging management activities are required.

Aging Management Programs

The following aging management programs are applied to metallic clamps of fuse holders that are not part of a larger assembly and are subject to aging management review:

- None Required

3.6.2.1.7 *High Voltage Insulators*

Materials

High voltage insulators requiring an aging management review are constructed of the following components:

- Porcelain
- Malleable iron
- Galvanized steel
- Cement

Environments

High voltage insulators requiring an aging management review are exposed to the following environments:

- Air – outdoor

Aging Effects Requiring Management

The following aging effects requiring management are associated with the high voltage insulators subject to aging management review:

- None

The aging management review determined that the aging effects are not significant and that no aging management activities are required.

Aging Management Programs

The following aging management programs are applied to high voltage insulators:

- None Required

3.6.2.1.8 *Switchyard Bus and Connections*

Materials

Switchyard bus and connections requiring an aging management review are constructed of the following components:

- Aluminum
- Copper
- Bronze
- Stainless steel
- Galvanized steel

Environments

Switchyard bus and connections requiring an aging management review are exposed to the following environments:

- Air – outdoor

Aging Effects Requiring Management

The following aging effects requiring management are associated with switchyard bus and connections subject to aging management review:

- None

The aging management review determined that the aging effects are not significant and that no aging management activities are required.

Aging Management Programs

The following aging management programs are applied to switchyard bus and connections:

- None Required

3.6.2.1.9 *Transmission Conductors and Connections*

Materials

Transmission conductors and connections requiring an aging management review are constructed of the following components:

- Aluminum
- Steel

Environments

Transmission conductors and connections requiring an aging management review are exposed to the following environments:

- Air – outdoor

Aging Effects Requiring Management

The following aging effects requiring management are associated with transmission conductors and connections subject to aging management review:

- None

The aging management review determined that the aging effects are not significant and that no aging management activities are required.

Aging Management Programs

The following aging management programs are applied to transmission conductors and connections:

- None Required

3.6.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801

NUREG-1801 indicates that further evaluation is necessary for certain aging effects and other issues. Section 3.6.2.2 of NUREG-1800 discusses these aging effects and other issues that require further evaluation. The following sections, numbered corresponding to the discussions in NUREG-1800, explain the VEGP approach to these areas requiring further evaluation.

3.6.2.2.1 *Electrical Equipment Subject to Environmental Qualification*

Environmental qualification analyses are TLAAs as defined in 10 CFR 54.3. TLAAs are evaluated in accordance with 10 CFR 54.21(c). The evaluation of this TLAA is addressed in Section 4.4 of this application.

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*

The discussion in NUREG-1800 concerns effects of these aging mechanisms in high voltage insulators.

The insulators evaluated for VEGP license renewal are those used to support uninsulated, high voltage electrical components such as transmission conductors and switchyard buses.

<u>Salt and Surface Contamination</u>

Various airborne materials such as dust, salt and industrial effluents can contaminate insulator surfaces. Surface contamination can be a problem in areas where there are greater concentrations of airborne particles due to proximity to facilities that discharge soot or proximity to the ocean where salt spray is prevalent. A large buildup of contamination enables the conductor voltage to track along the surface more easily and can lead to insulator flashover. The buildup of surface contamination is typically a slow, gradual process that is even slower for rural areas with generally less suspended particles and SO2 concentrations in the air than urban areas. VEGP is located in a rural area where airborne particle concentrations are comparatively low. Consequently, the rate of contamination buildup on the high voltage insulators at VEGP is not considered significant. Any such contamination accumulation is washed away naturally, by rainwater. The glazed surface on the high voltage insulators aids in the removal of this contamination.

Degradation of insulation quality due to surface contamination or salt deposits is not an aging effect requiring management for the high voltage insulators within the scope of this review.

Mechanical Wear

Loss of material due to mechanical wear is an aging effect for strain and suspension insulators if they are subject to significant movement. Movement of the insulators can be caused by wind blowing the supported transmission conductor, causing it to swing from side to side. If this swinging is frequent enough, it could cause wear in the metal contact points of the insulator string and between an insulator and the supporting hardware. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing and when they do, because of strong winds, they dampen quickly once the wind has subsided.

The VEGP transmission conductors in scope for LR are short spans located within the low voltage switchyard and between the low voltage and high voltage switchyards and therefore do not provide a large surface area to receive a wind load. The spans are approximately 466 feet in length. Therefore, the tension exerted on the conductors is less than would be experienced in typical applications, which could be up to 1,000 feet in length.

Although rare, surface rust may form where the galvanizing is burnt off due to flashover from lightning strikes. Surface rust is not a significant concern and would not cause a loss of intended function if left unmanaged.

Loss of material due to wear is not an aging effect requiring management for the high voltage insulators within the scope of this review.

Conclusion for High Voltage Insulators

To assure no additional aging effects exist beyond those discussed above and to validate the aging management review determinations, a review of industry experience was performed. This review included staff generic communications and industry operating experience related to high voltage insulators. VEGP operating experience related to high voltage insulators was also reviewed to validate aging effects for this commodity. No unique aging effects were identified from this review beyond those discussed above.

There are no aging effects requiring management for VEGP high voltage insulators.

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*

The discussion in NUREG-1800 concerns effects of these aging mechanisms in transmission conductors and connections and in switchyard bus and connections.

Transmission Conductors and Connections

Loss of Material for Transmission Conductors and Connections

Loss of material for transmission conductor mounting hardware due to wind induced abrasion and fatigue is an applicable aging mechanism but is not significant enough to require aging management for the period of extended operation. Wind induced abrasion and fatigue could be caused by transmission conductor movement resulting from wind loading.

Wind loading that can cause a transmission line to swing back and forth is considered in the design and installation of the overhead conductors and hardware. Strong winds could cause the transmission conductors to sway from side to side. If this swinging is frequent enough, it could cause the transmission conductor mounting hardware to wear. Although this mechanism is possible, experience has shown that the transmission conductors do not normally swing and when they do, because of strong winds, they dampen quickly once the wind has subsided.

The VEGP transmission conductors within the scope of this review are relatively short spans. The longest span is approximately 466 feet in length. Therefore, the tension exerted on the conductors is less than would be experienced in typical applications, which could be up to 1000 feet in length.

Therefore, it is concluded that mounting hardware loss of material caused by transmission conductor vibration (sway) and fatigue is not an aging effect requiring management.

Loss of Conductor Strength for Transmission Conductors and Connections

Loss of transmission conductor strength due to corrosion is an applicable aging effect, however ample design margin is present in the VEGP design to demonstrate the effect is not significant to require aging management for the period of extended operation.

All VEGP transmission conductors are Type ACSR (aluminum conductor steel reinforced). They are constructed of stranded aluminum conductors wound around a steel core. No organic materials are involved. The most prevalent mechanism contributing to loss of conductor strength of an ACSR transmission conductor is corrosion, which includes corrosion of the steel core and aluminum strand pitting.

There is a set percentage of composite conductor strength established at which a transmission conductor is replaced. The National Electrical Safety Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand under various load requirements, which includes consideration of ice, wind, and temperature. Tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength of an 80-year-old transmission conductor due to corrosion. Assuming a 30% loss of strength, there would still be significant margin between what is required by the NESC and actual conductor strength.

These requirements were reviewed concerning the specific transmission conductors used at VEGP. VEGP is designed to withstand standard light and medium loading conditions; therefore, the Ontario Hydroelectric heavy loading zone study is conservative. The conductors with the smallest ultimate strength margin (795 MCM ACSR) will be used as an illustration. The ultimate strength and the maximum design tension of 795 MCM ACSR are 31,200 lbs. and 10,920 lbs. respectively. The margin between the maximum design tension and the ultimate strength is 20,280 lbs.; i.e., there is a 65% ultimate strength margin. In the case of the 795 MCM ACSR transmission conductors, a 30% loss of ultimate strength would mean that there would still be a 35% ultimate strength margin between what is required by the NESC and the actual conductor strength in an 80-year old conductor.

This analysis shows that there is ample design margin in the transmission conductors at VEGP to demonstrate the effect is not significant to require aging management for the period of extended operation. Based on the conservatism in ultimate strength margin, it is concluded that loss of conductor strength is not an aging effect requiring management for the ACSR transmission conductors within the scope of this review.

<u>Increased Resistance of Connections for Transmission Conductors and Connections</u>

Transmission Conductors and Connections include the transmission conductors and the hardware used to secure the conductors to High Voltage Insulators. This does not include electrical connections from the transmission conductors down to equipment. These connections are included in the switchyard bus and connections commodity group. As such, increased connection resistance is not an aging effect requiring evaluation.

<u>Conclusion for Transmission Conductors and Connections</u>

In order to validate aging effects and to assure no additional aging effects exist beyond those discussed above, a review of industry experience was performed. This review included staff generic communications and industry operating experience related to transmission conductors and connections. VEGP operating experience related to transmission conductors and connections was also reviewed to validate aging effects for this commodity. No unique aging effects were identified from this review beyond those discussed above.

The Ontario Hydroelectric test envelops the conductors at VEGP, and based on the conservatism in strength margin, demonstrates that the material loss on the VEGP ACSR transmission conductors is acceptable for the period of extended operation without additional aging management. This illustrates with reasonable assurance that transmission conductors at VEGP will have ample strength margin to perform their intended function throughout the renewal term and do not require an aging management program.

Based on the materials used, results of the Ontario Hydroelectric test and the review of NRC generic communications, industry experience, and VEGP operating experience, there are no aging effects requiring aging management for transmission conductors and connections for the period of extended operation.

Switchyard Bus and Connections

Loss of Material for Switchyard Bus and Connections

The switchyard buses within the scope of this review are constructed of tubular aluminum pipe, all aluminum cable (AAC), and aluminum conductor steel reinforced (ACSR). The switchyard buses consist of short lengths of aluminum pipe and flexible cable conductors that do not normally vibrate and are supported by insulators mounted to static, structural components such as cement footings and structural steel. Based on this design configuration, wind induced vibration is not an applicable aging mechanism. With no connections to moving or vibrating equipment, loss of material due to wind induced abrasion and fatigue is not an aging effect requiring management.

Loss of Conductor Strength for Switchyard Bus and Connections

The portions of the switchyard bus and connections within the scope of this review are tubular aluminum pipe, all aluminum cable (AAC), and aluminum conductor steel reinforced (ACSR). None of these components are under tension like transmission conductors. Aluminum and steel exposed to the service conditions of the switchyard do not experience any appreciable aging effects, except for minor oxidation, which does not impact the ability of the switchyard bus to perform its intended function. Therefore, it is concluded that general corrosion resulting in loss of conductor strength of the switchyard bus is not an aging effect requiring management.

Increased Resistance of Connections for Switchyard Bus and Connections

The components involved in switchyard bus connections are constructed from cast aluminum, galvanized steel and stainless steel. No organic materials are involved.

Connections to the switchyard bus are welded. Conductor connections are generally of the bolted category. Components in the switchyard are exposed to precipitation. Connection materials exposed to the service conditions of the switchyard do not experience any appreciable aging effects, except for minor oxidation of the exterior surfaces, which does not impact the ability of the switchyard bus to perform its intended function.

Bolted switchyard connection surfaces are coated with an anti-oxidant compound (a grease-type sealant) prior to tightening the connection to prevent the formation of oxides on the metal surface and to prevent moisture from entering the connection, thus reducing the chances of corrosion. Based on operating experience, this method of installation has been shown to provide a corrosion resistant low electrical resistance connection.

Bolted connections are associated with the bus or the overhead transmission conductors. VEGP design incorporates the use of stainless steel “Belleville” washers on bolted electrical connections to maintain the proper torque and prevent loosening. This method of assembly is consistent with the good bolting practices recommended in EPRI Technical Report 1003471, "Bolted Joint Maintenance and Applications Guide," December 2002. A review of site operating experience revealed no switchyard bolted connection failures attributed to aging.

Therefore, it is concluded that oxidation or loss of pre-load resulting in increased connection resistance of the switchyard bus connections is not an aging effect requiring management.

<u>Conclusion for Switchyard Bus and Connections</u>

In order to validate aging effects and to assure no additional aging effects exist beyond those discussed above, a review of industry experience was performed. This review included staff generic communications and industry operating experience related to switchyard bus and connections. VEGP operating experience related to switchyard bus and connections was also reviewed to validate aging effects for this commodity. No unique aging effects were identified from this review beyond those discussed above.

Based on the materials used and the review of NRC generic communications, industry experience, and VEGP operating experience, there are no aging effects requiring aging management for switchyard bus and connections for the period of extended operation.

3.6.2.2.4 *Quality Assurance for Aging Management of Nonsafety-Related Components*

See Appendix B.1.3 for discussion of VEGP quality assurance procedures and administrative controls for aging management programs.

3.6.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA’s identified below are associated with electrical components.

- Environmental Qualification of Equipment (Section 4.4)

3.6.3 CONCLUSION

The electrical components subject to aging management review have been identified in accordance with the requirements of 10 CFR 54.21(a)(1). Aging effects have been identified based on plant and industry operating experience in addition to industry literature. Programs to manage these aging effects are identified in this section, and detailed program descriptions are provided in Appendix B.

These activities demonstrate that the effects of aging associated with electrical components are adequately managed such that there is reasonable assurance that the intended functions will be maintained consistent with the current licensing basis for the period of extended operation.

Table 3.6.1 Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-1	Electrical equipment subject to 10 CFR 50.49 environmental qualification (EQ) requirements	Degradation due to various aging mechanisms	Environmental Qualification Of Electric Components	Yes, TLAA	EQ equipment is not subject to aging management review because replacement is based on qualified life. Qualified life calculations for environmentally qualified electrical components are treated as TLAAs, and are discussed in Section 4.4. Further evaluation of this item is documented in Section 3.6.2.2.1. All electrical containment penetrations are EQ equipment and are therefore treated as TLAAs. As such, no separate aging management program is required.
3.6.1-2	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	No	Consistent with NUREG-1801. Cable bus is included in this line item. The Non-EQ Cables and Connections Program (Appendix B.3.34) will manage the effects of aging. This program includes visual inspection of a representative sample of accessible electrical cables and connections installed in adverse localized environments for cable and connection jacket surface anomalies.

Table 3.6.1 (Cont'd) Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-3	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	This NUREG-1801 item is not applicable to VEGP. In-scope electrical cables and connections used in instrumentation circuits (for radiation monitoring and nuclear instrumentation detectors) which require circuits with sensitive, high voltage, low-level signals are included in the EQ program.
3.6.1-4	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	No	Consistent with NUREG-1801. The Non-EQ Inaccessible Medium-Voltage Cables Program (Appendix B.3.35) will manage the effects of aging. This program includes inspection of medium-voltage cables exposed to significant moisture and voltage and testing as required.
3.6.1-5	Connector contacts for electrical connectors exposed to borated water leakage	Corrosion of connector contact surfaces due to intrusion of borated water	Boric Acid Corrosion	No	Consistent with NUREG-1801. The Boric Acid Corrosion Control Program (Appendix B.3.3) will manage the effects of aging. This program includes monitoring of the locations where potential leakage could occur.

Table 3.6.1 (Cont'd) Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-6	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	NUREG-1801 aging effects are not applicable to VEGP. As discussed in Table 3.6.2-1, the aging effects specified in NUREG-1801 are not applicable to the fuse holders at VEGP. Therefore, no AMP is required.
3.6.1-7	Metal enclosed bus - Bus/connections	Loosening of bolted connections due to thermal cycling and ohmic heating	Metal Enclosed Bus	No	This NUREG-1801 item is not applicable to VEGP. An evaluation of metal enclosed bus for VEGP determined that VEGP does not have any metal enclosed bus that supports a license renewal intended function. Therefore, metal enclosed bus at VEGP is not subject to aging management review.

Table 3.6.1 (Cont'd) Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.6.1-8	Metal enclosed bus - Insulation/ insulators	Reduced insulation resistance and electrical failure due to various physical, thermal, radiolytic, photolytic, and chemical mechanisms	Metal Enclosed Bus	No	This NUREG-1801 item is not applicable to VEGP. An evaluation of metal enclosed bus for VEGP determined that VEGP does not have any metal enclosed bus that supports a license renewal intended function. Therefore, metal enclosed bus at VEGP is not subject to aging management review.
3.6.1-9	Metal enclosed bus - Enclosure assemblies	Loss of material due to general corrosion	Structures Monitoring Program	No	This NUREG-1801 item is not applicable to VEGP. An evaluation of metal enclosed bus for VEGP determined that VEGP does not have any metal enclosed bus that supports a license renewal intended function. Therefore, metal enclosed bus at VEGP is not subject to aging management review.
3.6.1-10	Metal enclosed bus - Enclosure assemblies	Hardening and loss of strength due to elastomers degradation	Structures Monitoring Program	No	This NUREG-1801 item is not applicable to VEGP. An evaluation of metal enclosed bus for VEGP determined that VEGP does not have any metal enclosed bus that supports a license renewal intended function. Therefore, metal enclosed bus at VEGP is not subject to aging management review.

Table 3.6.1 (Cont'd) Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
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	Plant specific	Yes, plant specific	The aging effects specified in NUREG-1801 are not applicable to VEGP. Further evaluation of this item is documented 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	Plant specific	Yes, plant specific	The aging effects specified in NUREG-1801 are not applicable to VEGP. Further evaluation of this item is documented in Section 3.6.2.2.3.

Table 3.6.1 (Cont'd) Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801

Item Number	Component	Aging Effect/Mechanism	Aging Management Programs	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	Non-EQ Electrical Cable Connections Program	No	VEGP is providing a plant specific program as an alternate to the NUREG 1801, XI.E6 program. The Non-EQ Cable Connections One-Time Inspection Program (Appendix B.3.36) will verify the absence of aging effects requiring management. This program is a one-time inspection and includes inspecting or testing of a representative sample of electrical cable connections.
3.6.1-14	Fuse Holders (Not Part of a Larger Assembly) Insulation material	None	None	NA - No AEM or AMP	Consistent with NUREG-1801.

Table 3.6.2-1 Electrical Components – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
1	Cable Connections (Metallic Parts) not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections	Various metals used for electrical contacts	Air – indoor and outdoor	Loosening of bolted connections	Non-EQ Cable Connections One-Time Inspection Program	VI.A-1	3.6.1-13	E
2	Conductor insulation for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Reduced insulation resistance	Non-EQ Cables and Connections Program	VI.A-2	3.6.1-2	A
3	Conductor insulation for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections	Various organic polymers (e.g., EPR, SR, EPDM, XLPE)	Adverse localized environment caused by exposure to moisture and voltage	Localized damage and breakdown of insulation	Non-EQ Inaccessible Medium-Voltage Cables Program	VI.A-4	3.6.1-4	A

Table 3.6.2-1 (Cont'd) Electrical Components – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
4	Connector contacts for electrical connectors exposed to borated water leakage not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections	Various metals used for electrical contacts	Air with borated water leakage	Corrosion of connector contact surfaces	Boric Acid Corrosion Control Program	VI.A-5	3.6.1-5	A
5a	Fuse Holders (Not part of a larger assembly): Insulation not subject to 10 CFR 50.49 EQ requirements	Electrical insulation	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Adverse localized environment caused by heat, radiation, or moisture in the presence of oxygen	Reduced insulation resistance	Non-EQ Cables and Connections Program	VI.A-6	3.6.1-2	A
5b	Fuse Holders (Not part of a larger assembly): Insulation not subject to 10 CFR 50.49 EQ requirements	Electrical insulation	Insulation material – bakelite, phenolic melamine or ceramic, molded polycarbonate and other	Air – indoor	None	None Required	VI.A-7	3.6.1-14	A

Table 3.6.2-1 (Cont'd) Electrical Components – Summary of Aging Management Review

ID	Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
6	Fuse Holders (Not part of a larger assembly): Metallic Clamps	Provide electrical connections	Copper alloy	Air – indoor	None	None Required	VI.A-8	3.6.1-6	I 601
7a	High Voltage Insulators	Insulate and support an electrical conductor	Porcelain, malleable iron, galvanized steel, cement	Air – outdoor	None	None Required	VI.A-9	3.6.1-11	I 602
7b	High Voltage Insulators	Insulate and support an electrical conductor	Porcelain, malleable iron, galvanized steel, cement	Air – outdoor	None	None Required	VI.A-10	3.6.1-11	I 603
8	Switchyard Bus and Connections	Provide electrical connections	Aluminum, copper, bronze, stainless steel, galvanized steel	Air – outdoor	None	None Required	VI.A-15	3.6.1-12	I 604
9	Transmission Conductors and Connections	Provide electrical connections	Aluminum, steel	Air – outdoor	None	None Required	VI.A-16	3.6.1-12	I 605

Standard Notes for Electrical Components

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.

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

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

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

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

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

Plant Specific Notes for Electrical Components

601. The VEGP design and plant practices preclude the aging mechanisms identified in the corresponding NUREG-1801 Vol. 2 line item and the corresponding Table 1 item 3.6.1-6. Fatigue due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation is not an aging effect requiring management at VEGP for the metallic clamps of fuse holders that are not part of a larger assembly and are subject to aging management review.

    <u>Protection from Chemical Contamination, Corrosion, and Oxidation</u>: Fuse holders are protected by their design configuration and location within a controlled environment. The vast majority of fuse holder panels are NEMA 12 rated enclosures which protect the fuse holders from external sources of moisture. Plant walkdown discovered two panels in the Diesel Fuel Oil Storage Tank Structures which are not NEMA 12 rated. These panels have bolted covers with a gasket between the panel and cover which protects the fuse holders from external sources of moisture. In addition, these enclosures are located inside rooms that protect the panels from the weather, thereby providing two (2) protective barriers to moisture intrusion. Plant walkdown has confirmed that there are no potential sources of chemical contamination in the area. There are no sources of potential mechanical system leakage in proximity to the panels, that is not being aged managed. The fuse holders are totally enclosed in protective enclosures.

    <u>Vibration</u>: Plant walkdown has confirmed that there are no direct sources of vibration for the fuse holder panels, and the panels are mounted to their own unistrut support structure on a concrete wall or column. Since fuse holder panels are mounted on their own support structure separate from sources of vibration, vibration is not an applicable aging mechanism.

    <u>Ohmic Heating, Thermal Cycling, and Electrical Transients</u>: Fuses and fuse blocks are designed such that no overheating occurs. This takes into account high or low current applications. The only fuses that could potentially be exposed to thermal cycling and ohmic heating are those that carry significant current in power supply applications. Instrumentation and control (I&C) circuits characteristically operate at such low currents that no appreciable thermal cycling or ohmic heating occurs. The majority of fuse holders within the scope of this evaluation are not used in power supply applications. An exception to this is fuses for the diesel fuel oil transfer pumps located in the diesel fuel oil storage tank structures. These pumps are for transferring fuel oil to the Day Tank during operation of the diesel. The circuits are energized a small percentage of the time and are lightly loaded compared to the rating of the cable, therefore ohmic heating is also not a concern for these circuits. In conclusion, loss of pre-load/fatigue due to ohmic heating, thermal cycling, and electrical transients is not applicable to the fuse holders within the scope of license renewal at VEGP.

Frequency of Manipulation: The fuse holders subject to an AMR are those associated with fuses that are not routinely removed for maintenance and/or surveillance. When these circuits need to be de-energized, power is normally removed at the safety-related power supplies (motor control centers, power panels, etc.) or by opening links on terminal blocks.

In summary, it is concluded that fatigue of the metallic clamp due to ohmic heating, thermal cycling, electrical transients, frequent manipulation, vibration, chemical contamination, corrosion, and oxidation is not an aging effect requiring management for the fuse holders within the scope of this evaluation. Therefore, no aging management activities are required for the period of extended operation.

602. This line item for high voltage insulators summarizes the plant-specific determination that degradation of insulation quality due to presence of salt deposits and surface contamination is not an aging effect requiring management for VEGP. Refer to the further evaluation of degradation of insulator quality due to salt and surface contamination for VEGP provided in Section 3.6.2.2.2.

603. This line item for high voltage insulators summarizes the plant-specific determination that loss of material due to mechanical wear is not an aging effect requiring management for VEGP. Refer to the further evaluation of loss of material due to mechanical wear for high voltage insulators provided in Section 3.6.2.2.2.

604. This line item summarizes the plant-specific determination that there is not an aging effect requiring management for the VEGP switchyard bus and connections subject to aging management review. Refer to the further evaluation of aging effects for Switchyard Bus and Connections provided in Section 3.6.2.2.3.

605. This line item summarizes the plant-specific determination that there is not an aging effect requiring management for the VEGP transmission conductors subject to aging management review. Refer to the further evaluation of aging effects for Transmission Conductors provided in Section 3.6.2.2.3.

3.7 REFERENCES

1. 10 CFR 54, Requirements for Renewal of Operating Licenses for Nuclear Power Plants, U.S. Nuclear Regulatory Commission.

2. NEI 95-10, Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule, Rev. 6, Nuclear Energy Institute, June 2005.

3. NUREG 1800,Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, U.S. Nuclear Regulatory Commission, September 2005.

4. NUREG-1801, “Generic Aging Lessons Learned Report,” Volumes 1 and 2, NRC, September 2005.

SECTION 4 TIME LIMITED AGING ANALYSES

4.0 TIME-LIMITED AGING ANALYSES

Section 4 describes the Time-Limited Aging Analyses (TLAAs) for VEGP in accordance with 10 CFR 54.3(a) and 54.21(c).

Identification of TLAAs and exemptions is described in the following section:

- Section 4.1 - Identification of Time-Limited Aging Analyses

This section includes a list of TLAAs identified for VEGP (Table 4.1.2-1). This section also includes a list (Table 4.1.2-2) of the common TLAAs from NUREG-1800 Tables 4.1-2 and 4.1-3 (Ref. 2) with determination of their applicability to VEGP.

The subsequent sections describe the VEGP TLAAs within the following common general categories:

- Section 4.2 - Reactor Vessel Neutron Embrittlement
- Section 4.3 - Metal Fatigue
- Section 4.4 - Environmental Qualification of Equipment
- Section 4.5 - Concrete Containment Tendon Pre-stress
- Section 4.6 - Penetration Load Cycles
- Section 4.7 - Other Plant Specific Analyses

For each TLAA, a brief description of the TLAA, the affected components and a description of the method of disposition is provided. Additional discussion and details are provided for those TLAAs for which SNC recognizes the staff has previously requested such information. Each TLAA is, or will be, dispositioned using one or more of the following methods:

- Validation - 10 CFR 54.21(c)(1)(i) - The analysis remains valid for the period of extended operation, or
- Revision - 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 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

4.1.1 BACKGROUND

10 CFR 54.3 and 10 CFR 54.21 address time-limited aging analyses (TLAAs) in license renewal applications. 10 CFR 54.21(c) provides the following content requirements for TLAAs:

(c) An evaluation of time-limited aging analyses.

(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 exemption 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.

10 CFR 54.3 defines a time-limited aging analysis as:

Time-limited aging analyses, for the purposes of this part, are those licensee calculations and analyses that:

(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 CLB.

4.1.2 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

SNC used a two-step process to identify TLAAs for VEGP that is consistent with NEI 95-10 (Ref. 1). The first step in the process involved the review of docketed correspondence summaries and the UFSAR to identify correspondence that had the potential of containing a reference to a TLAA. The second method involved the review of design calculations to identify TLAAs. These two methods were then compared to compile a complete list of TLAAs for VEGP.

In the first step, the SNC focus was on a review of the CLB, as contained in the VEGP correspondence docket and the VEGP UFSAR. To refine the set of documents in the docketed correspondence that would be reviewed in detail, SNC developed a set of keywords related to TLAA issues in general and Criterion 3 of 10 CFR 54.3 in particular. If the docketed correspondence summaries addressed an issue that had the potential of containing a TLAA, the full correspondence was reviewed. The UFSAR was similarly reviewed. From this combined review, SNC identified a list of potential TLAAs. The potential TLAAs were then assessed against the remaining five criteria of 10 CFR 54.3 to develop a complete list of TLAAs from the CLB record.

In the second step, SNC focused its review on the design calculations performed for VEGP by SNC, Southern Company Services, Inc. (SCS) Engineering organization, Bechtel Power Corporation (the previous architect-engineer), and Westinghouse Electric Company for the Nuclear Steam Supply System equipment scope.

To identify the scope of calculations to review, SNC compiled a complete list from the VEGP Calculation Record database. This database is a composite listing of the calculations performed for VEGP by SNC, SCS, and Bechtel. SNC reviewed these calculations for content to determine which calculations supported the Time-Limited Aging Analyses identified in the first step of the process.

Westinghouse also conducted a review of their calculation record for the VEGP reactor vessel and provided a list of those calculations that met the criteria for a TLAA. As a second check of this activity, SNC compared the resulting TLAAs to the generic TLAAs identified by the Westinghouse Owners Group. No additional TLAAs were identified.

These two methods have resulted in a comprehensive list of TLAAs for VEGP. This list is summarized in Table 4.1.2-1. This table provides a list of VEGP TLAAs with the demonstration method used for each and the section of the LRA where each is discussed. Table 4.1.2-2 lists common TLAAs from NUREG-1800 Tables 4.1-2 and 4.1-3 (Ref. 2) with applicability to VEGP and the LRA section where those that apply to VEGP are discussed.

Table 4.1.2-1 List of VEGP Time-Limited Aging Analysis

TLAA Category	Description	Disposition Method	Section
1	Reactor Vessel Neutron Embrittlement:		4.2
	Neutron Fluence	10 CFR 54.21(c)(1)(ii)	4.2.1
	Upper Shelf Energy (USE)	10 CFR 54.21(c)(1)(ii)	4.2.2
	Pressurized Thermal Shock (PTS)	10 CFR 54.21(c)(1)(ii)	4.2.3
	Adjusted Reference Temperature (ART)	10 CFR 54.21(c)(1)(ii)	4.2.4
	Pressure-Temperature (P-T) Limits	10 CFR 54.21(c)(1)(ii) 10 CFR 54.21(c)(1)(iii)	4.2.5
2	Metal Fatigue:		4.3
	Fatigue of ASME Class 1 Components	10 CFR 54.21(c)(1)(i) 10 CFR 54.21(c)(1)(iii)	4.3.1
	Fatigue of ASME Non-Class 1 Components	10 CFR 54.21(c)(1)(i)	4.3.2
	Fatigue of the Reactor Coolant Pump Flywheel	10 CFR 54.21(c)(1)(i)	4.3.3
	Fatigue of Reactor Vessel Supports	10 CFR 54.21(c)(1)(i)	4.3.4
	Fatigue of Steam Generator Secondary Manway and Handhole Bolts	10 CFR 54.21(c)(1)(iii)	4.3.5
	Fatigue of Reactor Vessel Internals	10 CFR 54.21(c)(1)(i)	4.3.6
3	Environmental Qualification of Equipment	10 CFR 54.21(c)(1)(iii)	4.4
4	Concrete Containment Tendon Prestress	10 CFR 54.21(c)(1)(ii)	4.5
5	Penetration Load Cycles	10 CFR 54.21(c)(1)(i)	4.6

Table 4.1.2-1 (Cont'd) List of VEGP Time-Limited Aging Analysis

TLAA Category	Description	Disposition Method	Section
6	Plant-Specific TLAAs:		4.7
	Leak Before Break	10 CFR 54.21(c)(1)(i) 10 CFR 54.21(c)(1)(ii)	4.7.1
	Diesel Fuel Oil Storage Tank Corrosion Allowance	10 CFR 54.21(c)(1)(iii)	4.7.2
	Steam Generator Tube, Loss of Material	10 CFR 54.21(c)(1)(iii)	4.7.3
	Cold Overpressure Protection System (COPS)	10 CFR 54.21(c)(1)(ii) 10 CFR 54.21(c)(1)(iii)	4.7.4

Table 4.1.2-2 Potential TLAAs Listed in NUREG-1800 Tables 4.1-2 and 4.1-3

NUREG-1800 Examples	Applicable to VEGP	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 electrical equipment	Yes	4.4
Metal corrosion allowance	Yes for selected components	4.7.2 4.7.3
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No	N/A
Inservice local metal containment corrosion analyses	No	N/A
High-energy line-break postulation based on fatigue cumulative usage factor	Yes	4.3.1.7

Table 4.1.2-2 (Cont'd) Potential TLAAs Listed in NUREG-1800 Tables 4.1-2 and 4.1-3

NUREG-1800 Examples	**Applicable to VEGP**	**Section**
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	N/A
Low-temperature overpressure protection (LTOP) analyses	Yes	4.7.4
Fatigue analysis for the main steam supply lines to the turbine-driven auxiliary feedwater pumps	No	N/A
Fatigue analysis of the reactor coolant pump flywheel	Yes	4.3.3
Fatigue analysis of polar crane	No	N/A
Flow-induced Vibration Endurance Limit for the Reactor Vessel Internals	No	N/A
Transient Cycle Count Assumptions for the Reactor Vessel Internals	Yes	4.3.6
Ductility Reduction of Fracture Toughness for the Reactor Vessel Internals	No	N/A
Leak Before Break	Yes	4.7.1
Fatigue Analysis for the Containment Liner Plate	No	N/A
Containment Penetration Pressurization Cycles	Yes	4.6
Reactor Vessel Circumferential Weld Inspection Relief (BWR)	No	N/A

4.1.3 IDENTIFICATION OF EXEMPTIONS

10 CFR 54.21(c)(2) requires that the application for a renewed license include a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on TLAAs as defined in 10 CFR 54.3. SNC has compiled a list of exemptions pursuant to 10 CFR 50.12 through a search of docketed correspondence, the operating licenses, and the UFSAR. SNC then evaluated each exemption in effect to determine if it involved a TLAA as defined in 10 CFR 54.3.

As a result of this review, one exemption was identified as meeting the definition of a TLAA. Two other exemptions were identified that are not based on TLAAs, but which permitted changes in the methods for analyses that are TLAAs. The analyses associated with these exemptions have been included in Table 4.1.2-1.

The first involves an exemption from the then-current requirement of 10 CFR 50 Appendix A, General Design Criterion 4 to assume a break "…equivalent … to the double-ended rupture of the largest pipe in the reactor coolant system." By letter dated February 5, 1985, VEGP was granted an exemption that eliminated the need to (1) postulate pipe breaks in the primary loop, (2) install primary loop jet impingement shields and pipe whip restraints, and (3) consider associated dynamic effects (i.e. , jet impingement loads and blowdown loads in the primary loop and attached piping). The VEGP Leak-Before-Break Analyses are discussed in Section 4.7.1 of this application.

The second exemption is in regard to the requirements for determining the pressure-temperature (P-T) limit curves in Appendix G to 10 CFR Part 50. The exemption concerns elimination of the flange requirement based on the use of the NRC approved methodology in WCAP-16142-P, Revision 1. The VEGP P-T analyses are discussed in Section 4.2.5 of this application.

The third exemption is in regard to the requirements of 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention for Light-Water Nuclear Power Reactors for Normal Operation." This exemption permitted the use of ASME Code Case N-514, "Low Temperature Overpressure Protection" in lieu of the safety margins required by Appendix G to 10 CFR Part 50. The VEGP Cold Overpressure System setpoint analyses are discussed in Section 4.7.4 of this application.

4.2 REACTOR VESSEL NEUTRON EMBRITTLEMENT

The regulations that govern reactor vessel integrity are in 10 CFR Part 50:

- 10 CFR 50.60 requires all light-water reactors to meet the fracture toughness, pressure-temperature limits, and material surveillance program requirements for the reactor coolant boundary as set forth in Appendices G and H of 10 CFR Part 50.
- 10 CFR 50.61 contains the fracture toughness requirements for protection against pressurized thermal shock.

The VEGP design contains TLAAs that address the effects of neutron irradiation embrittlement of the reactor vessels for both units. These calculations are based on the effective full-power years (EFPY) for the reactor vessel and therefore are defined by the operating life. These calculations include the peak fluence values used to determine the limiting reactor vessel beltline materials, the Charpy Upper Shelf Energy (USE), the reference temperature for pressurized thermal shock (RT_{PTS}), the pressure and temperature (P-T) operating limit curves, the adjusted reference temperatures (ART).

For VEGP, 56 EFPY is a sufficient (and conservative) basis to cover the current term and the period of extended operation. This equates to operating at 99% capacity factor between 20 day outages every 18 months for the remainder of plant life (60 years). The End-Of-Life (EOL) basis for the Reactor Vessel Neutron Embrittlement analyses results in the following sections is 57 EFPY at the current VEGP licensed power level. SNC is expecting to submit a VEGP license amendment request for a Measurement Uncertainty Recapture (MUR) Uprate in 2007 that, if approved, will increase the VEGP licensed power level approximately 1.7%. The impact of approval of the MUR Uprate on the Reactor Vessel Neutron Embrittlement analyses results is that the VEGP EOL basis becomes 56.3 EFPY at the MUR Uprate power level. In summary, the results for the Reactor Vessel Neutron Embrittlement analyses bound the projected 56 EFPY at EOL for an operating term of 60 years.

The calculations have been updated to address the additional 20 years of operation and are addressed in the following sections:

- Section 4.2.1 – Neutron Fluence
- Section 4.2.2 – Upper Shelf Energy
- Section 4.2.3 – Pressurized Thermal Shock
- Section 4.2.4 – Adjusted Reference Temperature
- Section 4.2.5 – Pressure-Temperature (P-T) Limits

4.2.1 NEUTRON FLUENCE

SNC calculates neutron fluences using a discrete-ordinates transport method, satisfying the requirements set forth in Regulatory Guide 1.190 (Ref. 3).

SNC updated the reactor vessel neutron embrittlement calculations including the neutron fluence calculations for the critical components of the reactor vessel for EOL in accordance with 10 CFR 54.21(c)(1)(ii). The neutron fluence values that apply for the current operating conditions at VEGP are summarized in the Pressure and Temperature Limits Report (PTLR) for each unit. When the PTLR is updated to include P-T limit curves that bound the current level of neutron embrittlement for the unit, changes in neutron fluence values are included. The updated calculations show that the margins required in Appendix G will be maintained through the period of extended operation.

Table 4.2.1-1 summarizes the Unit 1 and 2 beltline peak fluence values for EOL at the inner wall (surface), 1/4T and 3/4T locations (Ref. 4).

Table 4.2.1-2 summarizes the Unit 1 and 2 extended beltline peak fluence values for EOL at the inner wall (surface), 1/4T and 3/4T locations. The fluence analysis of the upper shell and nozzles determined that these additional materials will exceed the 1x10^{17} n/cm^2 (E>1.0 MeV) threshold.

Table 4.2.1-1 Summary of EOL Beltline Calculated Neutron Fluence Projections

VEGP Unit 1: 45° Fluence			VEGP Unit 2: 30° Fluence		
Surface	**1/4T**	**3/4T**	**Surface**	**1/4T**	**3/4T**
3.20	1.91	0.677	3.02	1.80	0.639

Note: All fluence values are in units of 10^{19} n/cm^2 E > 1 MeV.

Table 4.2.1-2 Summary of the EOL Extended Beltline Calculated Neutron Fluence Projections

Vogtle Unit 1			Vogtle Unit 2		
Surface	**1/4T**	**3/4T**	**Surface**	**1/4T**	**3/4T**
0.0892	0.0532	0.0189	0.0761	0.0455	0.0150

Note: Fluence values are in units of 10^{19} n/cm^2, E > 1.0 MeV.

4.2.2 UPPER-SHELF ENERGY

Appendix G of 10 CFR Part 50 requires that the reactor vessel beltline materials must maintain a Charpy Upper-Shelf Energy (USE) of no less than 50 ft-lbs throughout the life of the reactor vessel, unless it is demonstrated, in a manner approved by the Director, Office of Nuclear Reactor Regulation (NRR), that lower values of Charpy USE will provide margins of safety against fracture equivalent to those required by Appendix G of Section XI of the ASME Code. The USE calculations meet the definition of a TLAA.

For VEGP, SNC has projected these analyses (Ref. 4) to the end of the period of extended operation for all reactor vessel materials with projected fluence exceeding 1 x 10^{17} n/cm^2 (MeV > 1.0), in accordance with the approved methods of Regulatory Guide 1.99, Revision 2 (Ref 5). The Unit 1 material having the lowest USE value at EOL is the Nozzle to Intermediate Shell Circumferential Weld 103-21, which has a projected End of Life (EOL) USE of 61 ft-lbs. The Unit 2 material having the lowest USE value at EOL is Inlet Nozzle to Nozzle Shell Course Weld 105-121A, which has a projected EOL USE of 56 ft-lbs. A summary of the results for the VEGP beltline and extended beltline materials is provided in Tables 4.2.2-1 and 4.2.2-2 for Units 1 and 2, respectively. Since all base materials and welds exceed the acceptance criteria of 10 CFR 50, Appendix G, these TLAAs have been shown to be acceptable in accordance with 10 CFR 54.21(c)(1)(ii). In accordance with the Reactor Vessel Surveillance Program (Appendix B.3.25), SNC may update the USE calculations to include credible data from analyses of surveillance capsules that are pulled in the future.

Table 4.2.2-1 VEGP Unit 1 Predicted EOL USE Calculations For all the Beltline Region Materials For License Renewal

Unit 1					
Material	**Weight % Of Cu**	**1/4T EOL Fluence (10^{19} n/cm^2 E>1.0 MeV)**	**Unirradiated USE (ft-lb)**	**Projected USE Decrease (%)**	**Projected EOL-USE (ft-lb)**
Intermediate Shell Plate B8805-1	0.083	1.91	90	22	70
Intermediate Shell Plate B8805-2	0.083	1.91	100	22	78
Intermediate Shell Plate B8805-3 (A)	0.062	1.91	107	10	96
Lower Shell Plate B8606-1	0.053	1.91	116	22	90
Lower Shell Plate B8606-2	0.057	1.91	113	22	88
Lower Shell Plate B8606-3	0.067	1.91	118	22	92
Intermediate Shell Longitudinal Weld Seams 101-124A, B & C (A)	0.042	1.91	134	3	130
Lower Shell Longitudinal Weld Seams 101-142A, B & C (A)	0.042	1.91	134	3	130
Intermediate to Lower Shell Circumferential Weld Seam 101-171 (A)	0.042	1.91	134	3	130
Inlet Nozzle B8809-1	0.22	0.0532	107	16	89
Inlet Nozzle B8809-2	0.22	0.0532	95	16	79
Inlet Nozzle B8809-3	0.22	0.0532	117	16	98
Inlet Nozzle B8809-4	0.22	0.0532	105	16	88
Inlet Nozzle to Nozzle Shell Course Weld 105-121A (B)	0.03	0.0532	119	10	107
	0.02	0.0532	127	10	114
Inlet Nozzle to Nozzle Shell Course Weld 105-121B	0.153	0.0532	110	15	93

Table 4.2.2-1 (Cont'd) VEGP Unit 1 Predicted EOL USE Calculations For all the Beltline Region Materials For License Renewal

Unit 1					
Material	**Weight % Of Cu**	**1/4T EOL Fluence (10^{19} n/cm^2 E>1.0 MeV)**	**Unirradiated USE (ft-lb)**	**Projected USE Decrease (%)**	**Projected EOL-USE (ft-lb)**
Inlet Nozzle to Nozzle Shell Course Weld 105-121C	0.153	0.0532	101	15	85
Inlet Nozzle to Nozzle Shell Course Weld 105-121D	0.153	0.0532	110	15	93
Nozzle Shell Course B8804-1	0.14	0.0532	94	11	83
Nozzle Shell Course B8804-2	0.10	0.0532	104	10	93
Nozzle Shell Course B8804-3	0.14	0.0532	92	11	81
Nozzle Shell Course Longitudinal Weld 101-122A, B, C	0.156	0.0532	109	16	86
Nozzle to Intermediate Shell Circumferential Weld 103-121	0.09	0.0532	70	12	**61**

Notes:

(A) Using Surveillance Capsule Data.

(B) This weld was manufactured from two different weld heats, both of which must be evaluated.

Table 4.2.2-2 VEGP Unit 2 Predicted EOL USE Calculations For all the Beltline Region Materials For License Renewal

Unit 2					
Material	**Weight % Of Cu**	**1/4T EOL Fluence (10^{19} n/cm^2 E>1.0 MeV)**	**Unirradiated USE (ft-lb)**	**Projected USE Decrease (%)**	**Projected EOL-USE (ft-lb)**
Intermediate Shell Plate R4-1	0.07	1.80	95	22	74
Intermediate Shell Plate R4-2	0.06	1.80	104	22	81
Intermediate Shell Plate R4-3	0.05	1.80	84	22	66
Lower Shell Plate B8825-1	0.06	1.80	83	22	65
Lower Shell Plate R8-1	0.07	1.80	87	22	68
Lower Shell Plate B8628-1 (A)	0.05	1.80	85	8	79
Intermediate Shell Longitudinal Weld Seams 101-124A, B & C (A)	0.05	1.80	152	8	140
Lower Shell Longitudinal Weld Seams 101-142A, B & C (A)	0.05	1.80	152	8	140
Intermediate to Lower Shell Circumferential Weld Seam 101-171 (A)	0.05	1.80	90	8	83
Inlet Nozzle B9806-1	0.07	0.0455	119	9	108
Inlet Nozzle B9806-2	0.06	0.0455	128	9	116
Inlet Nozzle R5-1	0.09	0.0455	147	9	133
Inlet Nozzle R5-2	0.08	0.0455	134	9	121
Inlet Nozzle to Nozzle	0.19	0.0455	91	16	76

Table 4.2.2-2 (Cont'd) VEGP Unit 2 Predicted EOL USE Calculations For all the Beltline Region Materials For License Renewal

Unit 2					
Material	**Weight % Of Cu**	**1/4T EOL Fluence (10^{19} n/cm^2 E>1.0 MeV)**	**Unirradiated USE (ft-lb)**	**Projected USE Decrease (%)**	**Projected EOL-USE (ft-lb)**
Shell Course Weld 105-121A [(B)]	0.09	0.0455	64	11	**56**
Inlet Nozzle to Nozzle Shell Course Weld 105-121B [(B)]	0.20	0.0455	108	17	90
	0.09	0.0455	110	11	98
Inlet Nozzle to Nozzle Shell Course Weld 105-121C	0.19	0.0455	91	16	76
Inlet Nozzle to Nozzle Shell Course Weld 105-121D	0.20	0.0455	108	17	90
Nozzle Shell Course R3-1	0.20	0.0455	79	14	67
Nozzle Shell Course R3-2	0.20	0.0455	79	14	67
Nozzle Shell Course R3-3	0.15	0.0455	84	12	73
Nozzle Shell Course Longitudinal Weld 101-122A, B, C	0.210	0.0455	111	18	91
Nozzle to Intermediate Shell Circumferential Weld 103-121	0.047	0.0455	200	9	182

Notes:

(A) Using Surveillance Capsule Data.

(B) This weld was manufactured from two different weld heats, both of which must be evaluated.

4.2.3 PRESSURIZED THERMAL SHOCK

10 CFR 50.61 requires licensees to protect against pressurized thermal shock transients in pressurized water reactors. The screening criterion in 10 CFR 50.61 is 270 °F for plates, forgings, and axial welds. The screening criterion is 300 °F for circumferential welds. According to this regulation, if the calculated RT_{PTS} for the limiting reactor beltline materials is less than the specified screening criterion, then the vessel is acceptable with regard to the risk of vessel failure during postulated pressurized thermal shock transients. For VEGP, these RT_{PTS} calculations meet the definition of a TLAA.

SNC has updated the RT_{PTS} calculations for VEGP Units 1 and 2 to cover the period of extended operation for all reactor vessel materials with projected fluence exceeding 1 x 10^{17} n/cm^2 (MeV > 1.0). The methods used to calculate RT_{PTS} are consistent with Regulatory Guide 1.99, Revision 2. SNC has determined that the screening criteria are met for both units. A summary of the results of these calculations is presented in Tables 4.2.3-1 and 4.2.3-2 for Units 1 and 2, respectively. The Unit 1 material having the highest RT_{PTS} value at EOL is the Intermediate Shell Plate B8805-2, which has a EOL RT_{PTS} value of 123°F (Ref. 4). The Unit 2 material having the highest RT_{PTS} value at EOL is the Nozzle Shell Course R3-3, which has a EOL RT_{PTS} value of 134°F (Ref. 4). Since all base materials and welds meet the screening criteria contained in 10 CFR 50.61 at EOL, these TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). In accordance with the Reactor Vessel Surveillance Program (Appendix B.3.25), SNC may update the RT_{PTS} calculations to include credible data from the analysis of surveillance capsules that are pulled in the future.

Table 4.2.3-1 VEGP Unit 1 Values of RT_{PTS} at EOL [(A)]

Unit 1							
Material	**RG 1.99 R2 Method**	**CF (°F)**	**FF[(B)]**	**ΔRT_{PTS}[(C)] (°F)**	**$IRT_{NDT(U)}$[(D)] (°F)**	**Margin[(E)] (°F)**	**RT_{PTS}[(F)] (°F)**
Intermediate Shell Plate B8805-1	Position 1.1	53.1	1.306	69.4	0	34	103
Intermediate Shell Plate B8805-2	Position 1.1	53.1	1.306	69.4	20	34	123
Intermediate Shell Plate B8805-3	Position 1.1	38.4	1.306	50.2	30	34	114
	Position 2.1	37.8	1.306	49.4	30	34[(G)]	113
Lower Shell Plate B8606-1	Position 1.1	32.8	1.306	42.8	20	34	97
Lower Shell Plate B8606-2	Position 1.1	35.2	1.306	46.0	20	34	100
Lower Shell Plate B8606-3	Position 1.1	41.9	1.306	54.7	10	34	99
Inter. Shell Longitudinal Weld Seam 101-124A,B,C	Position 1.1	34.5	1.306	45.1	-80	45.1	10
	Position 2.1	20.8	1.306	27.2	-80	27.2	-26
Intermediate to Lower Shell Girth Weld Seam 101-171	Position 1.1	34.5	1.306	45.1	-80	45.1	10
	Position 2.1	20.8	1.306	27.2	-80	27.2	-26
Lower Shell Long. Weld Seams 101-142A,B,C	Position 1.1	34.5	1.306	45.1	-80	45.1	10
	Position 2.1	20.8	1.306	27.2	-80	27.2	-26
Inlet Nozzle B8809-1	Position 1.1	177.5	0.394	69.9	-20	34	84
Inlet Nozzle B8809-2	Position 1.1	177.0	0.394	69.7	-10	34	94
Inlet Nozzle B8809-3	Position 1.1	176.5	0.394	69.5	-10	34	94
Inlet Nozzle B8809-4	Position 1.1	177.8	0.394	70.1	-20	34	84
Inlet Nozzle to Nozzle Shell Course Weld 105-121A [(H)]	Position 1.1	41.0	0.394	16.2	-80	16.2	-48
	Position 1.1	27.0	0.394	10.6	-60	10.6	-39
Inlet Nozzle to Nozzle Shell Course Weld 105-121B	Position 1.1	74.1	0.394	29.2	-80	29.2	-22
Inlet Nozzle to Nozzle Shell Course Weld 105-121C	Position 1.1	74.1	0.394	29.2	-40	29.2	18

Table 4.2.3-1 (Cont'd) VEGP Unit 1 Values of RT_{PTS} at EOL $^{(A)}$

Unit 1							
Material	**RG 1.99 R2 Method**	**CF (°F)**	**FF$^{(B)}$**	**$\Delta RT_{PTS}$$^{(C)}$ (°F)**	**$IRT_{NDT(U)}$$^{(D)}$ (°F)**	**Margin$^{(E)}$ (°F)**	**$RT_{PTS}$$^{(F)}$ (°F)**
Inlet Nozzle to Nozzle Shell Course Weld 105-121D	Position 1.1	74.1	0.394	29.2	-80	29.2	-226
Nozzle Shell Course B8804-1	Position 1.1	100.5	0.394	39.6	28	34	102
Nozzle Shell Course B8804-2	Position 1.1	65.0	0.394	25.6	15	25.6	66
Nozzle Shell Course B8804-3	Position 1.1	102.3	0.394	40.3	40	34	114
Nozzle Shell Course Longitudinal Weld 101-122A,B,C	Position 1.1	73.7	0.394	29.0	-70	29.0	-12
Nozzle to Intermediate Shell Circumferential Weld 103-121	Position 1.1	122.0	0.394	48.1	-50	48.1	46

<u>Notes:</u>

A EOL Fluence (at the end of the period of extended operation) is $3.20 \times 10^{19} n/cm^2$ E > 1.0 MeV for the beltline region and $8.92 \times 10^{17} n/cm^2$ E>1.0 MeV for the extended beltline region.

B FF = fluence factor = $f^{\ 0.28-0.\ \log f}$

C ΔRT_{PTS} = CF * FF

D Initial RT_{NDT} values are measured values

E $M = 2 * \sigma_i^2 + \sigma_\Delta^{2\,1/2}$

F $RT_{PTS} = RT_{NDTU} + \Delta RT_{PTS}$ + Margin °F

G No relief to a lower value since the plate surveillance data was deemed not credible per WCAP-16278-NP.

H This weld was manufactured using two different weld heats, both of which must be evaluated.

Table 4.2.3-2 VEGP Unit 2 Values of RT_{PTS} at EOL (A)

Unit 2							
Material	**RG 1.99 R2 Method**	**CF (°F)**	**FF**(B)	**ΔRT_{PTS}**(C) **(°F)**	**$IRT_{NDT(U)}$**(D) **(°F)**	**Margin**(E) **(°F)**	**RT_{PTS}**(F) **(°F)**
Intermediate Shell Plate R4-1	Position 1.1	44.0	1.292	56.8	10	34	101
Intermediate Shell Plate R4-2	Position 1.1	37.0	1.292	47.8	10	34	92
Intermediate Shell Plate R4-3	Position 1.1	31.0	1.292	40.1	30	34	104
Lower Shell Plate B8825-1	Position 1.1	37.0	1.292	47.8	40	34	122
Lower Shell Plate R8-1	Position 1.1	44.0	1.292	56.8	40	34	131
Lower Shell Plate B8628-1	Position 1.1	31.0	1.292	40.1	50	34	124
	Position 2.1	20.4	1.292	26.4	50	17	93
Inter. Shell Longitudinal Weld Seam 101-124A,B,C	Position 1.1	43.3	1.292	55.9	-10	55.9	102
	Position 2.1	21.5	1.292	27.8	-10	27.8	46
Intermediate to Lower Shell Girth Weld Seam 101-171	Position 1.1	43.3	1.292	55.9	-30	55.9	82
	Position 2.1	21.5	1.292	27.8	-30	27.8	26
Lower Shell Long. Weld Seam 101-142A,B,C	Position 1.1	43.3	1.292	55.9	-10	55.9	102
	Position 2.1	21.5	1.292	27.8	-10	27.8	46
Inlet Nozzle B9806-1	Position 1.1	44.0	0.364	16.0	-50	16.0	-18
Inlet Nozzle B9806-2	Position 1.1	37.0	0.364	13.5	-40	13.5	-13
Inlet Nozzle R5-1	Position 1.1	58.0	0.364	21.1	-20	21.1	22
Inlet Nozzle R5-2	Position 1.1	51.0	0.364	18.6	-20	18.6	17
Inlet Nozzle to Nozzle Shell Course Weld 105-121A(G)	Position 1.1	88.1	0.364	32.1	-90	32.1	-26
	Position 1.1	46.3	0.364	16.9	-70	16.9	-36
Inlet Nozzle to Nozzle Shell Course Weld 105-121B(G)	Position 1.1	94.4	0.364	34.5	-80	34.5	-11
	Position 1.1	43.2	0.364	15.7	-80	15.7	-49
Inlet Nozzle to Nozzle Shell	Position 1.1	88.1	0.364	32.1	-90	32.1	-26

Table 4.2.3-2 (Cont'd) VEGP Unit 2 Values of RT_{PTS} at EOL (A)

Unit 2							
Material	**RG 1.99 R2 Method**	**CF (°F)**	**FF(B)**	**ΔRT_{PTS}(C) (°F)**	**$IRT_{NDT(U)}$(D) (°F)**	**Margin(E) (°F)**	**RT_{PTS}(F) (°F)**
Course Weld 105-121C							
Inlet Nozzle to Nozzle Shell Course Weld 105-121D	Position 1.1	94.4	0.364	34.4	-80	34.4	-11
Nozzle Shell Course R3-1	Position 1.1	152.5	0.364	55.5	20	34	110
Nozzle Shell Course R3-2	Position 1.1	152.5	0.364	55.5	40	34	130
Nozzle Shell Course R3-3	Position 1.1	110.5	0.364	40.2	60	34	134
Nozzle Shell Course Longitudinal Weld 101-122A, B, C	Position 1.1	96.6	0.364	35.2	-60	35.2	10
Nozzle to Intermediate Shell Circumferential Weld 103-121	Position 1.1	30.7	0.364	11.2	-50	11.2	-27

Notes:

A. EOL Fluence (at the end of the period of extended operation) is $3.02\times10^{19} n/cm^2$ (E > 1.0 MeV) for the beltline, $7.61\times10^{17} n/cm^2$ (E > 1.0 MeV) for the extended beltline.

B. FF = fluence factor = $f^{(0.28 - 0.1 \log (f))}$

C. ΔRT_{PTS} = CF * FF

D. Initial RT_{NDT} values are measured values

E. $M = 2 * (\sigma_i^2 + \sigma_\Delta^2)^{1/2}$

F. $RT_{PTS} = RT_{NDT(U)} + \Delta RT_{PTS}$ + Margin (°F)

G. This weld was manufactured from two different weld heats, both of which must be evaluated.

4.2.4 ADJUSTED REFERENCE TEMPERATURE

The calculations to determine the adjusted reference temperature (ART) for the critical components of the reactor vessel meet the definition of a TLAA pursuant to the criteria of 10 CFR 54.3. SNC updated these calculations for EOL through the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). Based upon the data presented in the above sub-sections, the most limiting materials and locations for the ART are:

- VEGP Unit 1: Intermediate Shell Plate B8805-2 with an ART at 1/4T of 117 °F and an ART at 3/4T of 101 °F (Ref. 4).
- VEGP Unit 2: Lower Shell Plate R8-1 with an ART at 1/4T of 125 °F and an ART at 3/4T of 113 °F (Ref. 4).

Though the extended beltline materials are limiting at the surface, at the 1/4T and 3/4T locations, the beltline materials become limiting again. The fluence drop off is exponential through the wall, so the extended beltline fluences get very small relative to the larger beltline fluences. Since the beltline material ART values become limiting at the 1/4T and 3/4T locations, the EOL P-T curves will be controlled by beltline materials and not extended beltline materials.

4.2.5 PRESSURE-TEMPERATURE (P-T) LIMITS

Appendix G of 10 CFR Part 50 requires heat-up and cool-down of the reactor pressure vessel be accomplished within established limits for pressure and temperature. Plant specific calculations establish these limits and utilize materials and fluence data obtained through plant specific reactor surveillance capsule programs. The calculations for VEGP Units 1 and 2 meet the definition of a TLAA.

Vogtle Units 1 and 2 are currently operating to 36 EFPY P-T limit curves, which are included in the Pressure and Temperature Limits Report (PLTR) for each unit. As described in the PTLR, the Reactor Vessel Surveillance Program (Appendix B.3.25) updates the P-T limit curves considering the data gained from capsules SNC pulls, and the content and update of the PTLR is in accordance with the VEGP Technical Specification 5.6.6. When the operating conditions of each unit merit the use of a different curve, the PTLR for that unit is updated to include P-T limit curves that bound the current level of neutron embrittlement (i.e., EFPY) for the unit. Therefore, this TLAA demonstration is made in accordance with 10 CFR 54.21(c)(1)(ii) and 10 CFR 54.21(c)(1)(iii).

4.3 METAL FATIGUE

The VEGP design basis addresses the effects of metal fatigue. Fatigue is an age-related degradation mechanism caused by cyclic stressing of a component by either mechanical or thermal stresses. Fatigue analyses are a TLAA if they meet all six elements of the definition in 10 CFR 54.3(a). If the analyses are based on a number of cycles estimated for the current license term, they may be considered to meet criteria 54.3(a)(3) of being based on the current operating term. If a component has a fatigue TLAA that remains valid (demonstration in accordance with 10 CFR 54.21 (c)(1)(i)), or is projected to cover the period of extended operation (demonstration in accordance with 10 CFR 54.21 (c)(1)(ii)), then cracking due to metal fatigue is not an aging effect requiring management for that component. If the fatigue TLAA cannot be demonstrated to remain valid for the period of extended operation by either of these methods, then an aging management program is needed to manage the fatigue (demonstration in accordance with 10 CFR 54.21(c)(1)(iii)).

The following sections discuss the TLAA evaluation for the VEGP fatigue analyses:

- Section 4.3.1 – Fatigue of ASME Class 1 Components
- Section 4.3.2 – Fatigue of Non-ASME Class 1 Components
- Section 4.3.3 – Fatigue of the Reactor Coolant Pump Flywheel
- Section 4.3.4 – Fatigue of Reactor Vessel Supports
- Section 4.3.5 – Fatigue of SG Secondary Manway and Handhole Bolts

4.3.1 FATIGUE OF ASME CLASS 1 COMPONENTS

The design of VEGP incorporates the requirements of Section III Class 1 of the ASME Code, which require a discrete analysis of the thermal, mechanical and dynamic stress cycles on components that make up the reactor coolant pressure boundary. Although original design specifications commonly state that the transient conditions are for a 40-year design life, the fatigue analyses themselves are based on the specified number of occurrences of each transient rather than on this lifetime. The design number of each transient was selected to be somewhat larger than expected to occur during the 40-year licensed life of the plant, based on operating experience, and on projections of future operation based on the system designs.

In addition to the original design transients, fatigue loading transients and issues have been subsequently identified that are not part of the original fatigue analyses. For the lower pressurizer head and surge line, thermal stratification and insurge/ outsurge transients are evaluated (IEB 88-11). Also, the impact of the reactor coolant system environment on the fatigue life of piping and components (GSI-190) requires specific evaluation for license renewal.

The presentation of the TLAA evaluations for ASME Class 1 component fatigue is as follows:

- Section 4.3.1.1 – Class 1 Piping and Component Design Transient Cycles
- Section 4.3.1.2 – CUF Monitoring – SG Main and Auxiliary Feedwater Nozzles
- Section 4.3.1.3 – CUF Monitoring – Charging Nozzles
- Section 4.3.1.4 – Thermal Stratification of the Surge Line and Lower Pressurizer Head (IEB 88-11)
- Section 4.3.1.5 Effects of Reactor Coolant System Environment on Fatigue Life of Piping and Components (GSI-190)
- Section 4.3.1.6 Full Structural Weld Overlays (FSWOL) on Pressurizer Spray Nozzles, Safety and Relief Nozzles, and Surge Line
- Section 4.3.1.7 High Energy Line Break Postulated Locations Based on Fatigue Cumulative Usage Factor
- Section 4.3.1.8 Conclusion

4.3.1.1 Class 1 Piping and Component Design Transient Cycles

Operating experience at VEGP and similar units has demonstrated that the analyzed numbers of design basis transients are, in general, conservative for a 40 year life. VEGP UFSAR Table 3.9.N.1-1 provides a summary of the RCS design transients for Plant Vogtle. Table 4.3.1-1 provides a listing of these transients and indicates those that are monitored by the Fatigue Monitoring Program (Appendix B.3.38). The program monitors transients and components to assure that actual plant experience remains bounded by the assumptions used in the design analyses. This program counts cycles of design basis transient events and evaluates the number of occurrences against the design basis. For transients not monitored, Table 4.3.1-1 provides the basis for not being monitored.

Table 4.3.1-2 lists the component cyclic or transient limits that currently require monitoring at VEGP as listed in VEGP UFSAR Table 3.9.N.1-2. The table includes the design basis cycles for each transient monitored and the number of cycles that VEGP has experienced as of October 9, 2005. The table also includes projected cycles, based on current cycles to date to demonstrate that these transients are not projected to exceed the design cycles in 60 years.

For the feedwater cycling, loss of charging flow (loop 1, loop 4), and loss of letdown and return to service transients, the VEGP current licensing basis (CLB) relies on Cumulative Usage Factor (CUF) monitoring using stress-based fatigue monitoring (SBF) of the limiting component locations (as indicated in the table). These component locations are the steam generator main and auxiliary feedwater nozzles, and the normal and alternate charging nozzles. The evaluation of the projected CUF for the period of extended operation for these locations is discussed in Section 4.3.1.2 and Section 4.3.1.3 and included in Table 4.3.1-2.

The VEGP CLB also relies on stress-based fatigue monitoring for the pressurizer surge line and lower pressurizer head due to thermal stratification issues (NRC’s IEB 88-11). The evaluation of the projected CUF for the period of extended operation is discussed in Section 4.3.1.4.

The combination of cycle projections and CUF monitoring and projections show that the design fatigue analyses for VEGP Class 1 components and piping remain valid, or are adequately managed, for 60 years. In summary, the TLAA has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i) and (iii).

4.3.1.2 CUF Monitoring – SG Main and Auxiliary Feedwater Nozzles

The VEGP steam generators (SGs) were analyzed in accordance with ASME Section III Class 1 requirements. In this analysis, one of the transients included in the SG fatigue analysis was 2000 cycles of intermittent (slug) feeding of 32°F feedwater into the steam generator at hot standby or no-load conditions. These 2000 cycles also include feedwater additions required during plant heatup and cooldown operations. Based on current operating experience, several of the steam generators are projected to exceed this number of cycles.

Rather than simple cycle counting of feedwater cycling events, VEGP uses stress-based fatigue monitoring of the SG main and auxiliary feedwater nozzles, which are the locations in the steam generators most affected by these events. The fatigue analysis for these nozzles was reviewed and it was determined that the CUF with these increased cycles would remain well below 1.0. Table 4.3.1-2 shows the calculated and 60-year projected CUFs for the main and auxiliary feedwater nozzles. These nozzles will be managed using stress-based fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that the CUF remains below 1.0.

In summary, the TLAA has been demonstrated to be acceptable for the period of extended operation in accordance with CFR 54.21(c)(1)(iii).

4.3.1.3 CUF Monitoring – Charging Nozzles

The Class 1 portion of the charging and letdown systems were analyzed for 20 cycles each of Letdown Trip with Delayed Return and Charging Trip with Prompt Return. Projected cycles of these two transients are greater than design, however the magnitude of the transients and resultant fatigue contribution is smaller than in the design analyses.

VEGP uses stress-based fatigue monitoring of the normal and alternate charging nozzles, which are the bounding locations in the Class 1 portion of the charging and letdown systems, rather than simple cycle counting of loss of charging and/or loss of letdown events to ensure the design limits are maintained for those components affected by these cycles. (Ref. 25)

The fatigue analysis for these nozzles was reviewed and it was determined that the CUF with these increased cycles would remain well below 1.0. Table 4.3.1-2 shows the calculated and 60-year projected CUFs for the charging nozzles. These nozzles will be managed using stress-based fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that CUF remains below 1.0 and the lowest established limit (see Section 4.3.1.7).

In summary, the TLAA has been demonstrated to be acceptable for the period of extended operation in accordance with CFR 54.21(c)(1)(iii).

4.3.1.4 Thermal Stratification of the Surge Line and Lower Pressurizer Head (IEB 88-11)

In support of the SNC response to NRC IEB 88-11 (Ref. 8), the impact of thermal stratification on the fatigue usage in the surge line was evaluated. That evaluation showed the surge line fatigue usage was acceptable for 40 years of operation, including the effects of thermal stratification due to insurge and outsurge from the pressurizer. For license renewal, the SBF software module for the surge line calculates the actual CUF due to changes in temperature, pressure, and other parameters that affect the fatigue of the surge line and lower pressurizer head, and also accounts for pressurizer insurge/outsurge and thermal stratification effects in both the lower pressurizer head and both surge line nozzles. The highest 60-year projected CUF for these components is 0.06 for the Unit 2 hot leg surge nozzle. Thus, SNC addresses Renewal Applicant Action Item 3.3.1.1.-1 contained in WCAP-14574A for license renewal by using the stress-based monitoring software for the pressurizer lower head and surge line nozzles and demonstrating that design limits are maintained throughout the extended operating period. The pressurizer lower head and surge line nozzles will be managed using stress-based fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that CUF remains below 1.0 and the lowest established limit (see Sections 4.3.1.5.3 and 4.3.1.6).

In summary, the TLAA has been demonstrated to be acceptable for the period of extended operation in accordance with CFR 54.21(c)(1)(iii).

4.3.1.5 Effects of Reactor Coolant System Environment on Fatigue Life of Piping and Components (GSI-190)

Generic Safety Issue (GSI) 190 addresses fatigue life of metal components and was closed by the NRC in December 1999. In the closure letter, however, the NRC concluded that licensees should address the effects of reactor coolant environment on the fatigue life of selected components as aging management programs are formulated in support of license renewal. SNC has evaluated these environmentally-assisted fatigue (EAF) effects for plant-specific locations equivalent to those identified in Section 5.4 of NUREG/CR-6260 (Ref. 9) for the newer vintage Westinghouse plant. SNC used the formulas from NUREG/CR-5704 (Ref. 10) for stainless steel components and from NUREG/CR-6583 (Ref. 11) for carbon and low-alloy steel components.

The locations evaluated were shown to be acceptable for 60 years, considering projected plant operation. The evaluation results for each of the specific locations is summarized in Table 4.3.1-3 and discussed below.

4.3.1.5.1 *EAF Evaluation - Reactor Vessel Shell and Lower Head (Ref 13)*

The cumulative usage factor (CUF) determined from the ASME Code fatigue analysis for the vessel wall transition of the VEGP reactor vessels is 0.0166 based on a Westinghouse 40-year design calculation. Since the number of cycles assumed in that calculation are not expected to be exceeded during the 60-year extended life of VEGP, this CUF value will be used as the design CUF to which the appropriate F_{en} value should be applied. Although the inside surface of the vessel is clad with stainless steel and Alloy 600, in accordance with the ASME Code methodology, it is appropriate to perform the fatigue analysis of the low alloy steel vessel wall underneath the cladding, as was done in the NUREG/CR-6260 (Ref. 9) analysis. Therefore, the maximum environmental factor of 2.45 for low alloy steel from NUREG/CR-6583 (Ref. 11) for a low dissolved oxygen environment should be applied. The resulting environmental fatigue adjusted value of 0.0407 is less than 1.0, and therefore acceptable.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

4.3.1.5.2 *EAF Evaluation - Reactor Vessel Inlet and Outlet Nozzles (Ref 13)*

From the Westinghouse 40-year design calculations, the maximum CUF for the VEGP reactor vessel inlet and outlet nozzles are 0.0758 and 0.1216, respectively. Since the assumed cycles of these calculations are not expected to be exceeded during the period of extended operation (60-year life), the appropriate F_{en} value should be applied to these design values. Use of the maximum environmental factor of 2.45 for low alloy steel from NUREG/CR-6583 (Ref. 11) for a low dissolved oxygen environment increases the maximum CUF value to environmental fatigue adjusted values of 0.1857 and 0.2979, respectively, which are less than 1.0 and therefore acceptable.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

4.3.1.5.3 *EAF Evaluation - Surge Line Hot Leg Nozzle (Ref. 12 and 13)*

The maximum design CUF determined from the ASME Code fatigue analysis for the VEGP surge line hot leg nozzle is 0.95. Applying the maximum F_{en} for stainless steel from NUREG/CR-5704 (Ref. 10) of 15.35 increases the maximum CUF value to an environmental fatigue adjusted value of 14.58, which is greater than 1.0. Therefore, a different demonstration method is used.

Using fatigue monitoring software, cooldown/heatup cycles for Unit 1 and Unit 2 from 6/30/95 through 10/9/05 were analyzed to determine the average CUF per cooldown/heatup cycle. Using this data, SNC has shown that at the surge line hot leg nozzle the projected CUF for 200 cooldown/heatup cycles is 0.00534 for Unit 1 and 0.00628 for Unit 2. Applying the maximum environmental factor for stainless steel from NUREG/CR-5704 of 15.35 to the higher value for Unit 2 results in an environmental fatigue adjusted value of 0.09642, which is less than 1.0 and therefore acceptable.

The surge line is managed using stress-based fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that the CUF remains below the established limit. The allowable CUF in the program for the surge line hot leg nozzle will be reduced from 1.0000 to 0.0651 to account for the maximum F_{en} value of 15.35 used in this evaluation.

Environmental fatigue calculations were also performed for the pressurizer heater penetrations and the pressurizer surge nozzles with results even lower than shown above for the surge line hot leg nozzles.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.1.5.4 *EAF Evaluation - Charging Nozzle (Ref. 12 and 13)*

The maximum design CUF determined from the ASME Code fatigue analysis for the charging nozzle is 0.995. With a maximum F_{en} for stainless steel from NUREG/CR-5704 (Ref. 10) of 15.35, the maximum CUF increases to an environmental fatigue adjusted value of 15.20, which is greater than 1.0. Therefore, a different demonstration method is used.

Using fatigue monitoring software, relevant events for Unit 1 and Unit 2 from 6/30/95 through 10/9/05 were analyzed to determine the average CUF per event. Using this data, SNC has shown that the maximum 60-year projected CUF for the charging nozzles is 0.10116 for the Unit 2 alternate charging nozzle. The average F_{en} calculated for the charging nozzles using the formulas from NUREG/CR-5704 for stainless steel is 7.6. The resulting environmental fatigue adjusted value is 0.76881, which is less than 1.0 and therefore acceptable.

The charging nozzles are managed using stress-based fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that the CUF remains below the established limit. The allowable CUF in the program for the charging nozzle will be reduced from 1.0000 to 0.1316 to account for the calculated F_{en} value of 7.6 used in this evaluation.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.1.5.5 *EAF Evaluation - Safety Injection Nozzle (Ref. 12 and 13)*

This location in Section 5.4 of NUREG/CR-6260 (Ref. 9) is the BIT nozzle that connects the 1½-inch boron injection line to the reactor coolant system at the cold leg. At VEGP, the maximum design CUF determined from the ASME Code fatigue analysis for this location is 0.6290. With a maximum F_{en} for stainless steel from NUREG/CR-5704 (Ref. 10) of 15.35, the maximum CUF increases to an environmental fatigue adjusted value of 9.66, which is greater than 1.0. Therefore, a different demonstration method is used.

Using fatigue monitoring results through 10/9/05, SNC has shown the 60-year projected CUF at this location to be 0.02209 on Unit 1 and 0.15049 on Unit 2. The average F_{en} calculated for the safety injection nozzles using the formulas from NUREG/CR-5704 for stainless steel is 5.535. The resulting environmental fatigue adjusted values are 0.12280 for Unit 1 and 0.83296 for Unit 2, which are less than 1.0 and therefore acceptable.

The safety injection nozzles will be managed using fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that the CUF remains below the established limit. The allowable CUF in the program for the safety injection nozzles will be reduced from 1.0000 to 0.1807 to account for the calculated F_{en} value of 5.535 used in this evaluation.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.1.5.6 *EAF Evaluation - RHR System Class 1 Piping (Ref. 12 and 13)*

This location in Section 5.4 of NUREG/CR-6260 is the stainless steel inlet piping transition. For VEGP, this location was identified as the Accumulator//RHR Nozzle. The design CUF determined from the ASME Code fatigue analysis for the Accumulator/RHR nozzle is 0.95. With a maximum environmental factor (F_{en}) for stainless steel from NUREG/CR-5704 (Ref. 10) of 15.35 the maximum CUF increases to an environmental fatigue adjusted value of 14.58, which is greater than 1.0. Therefore, a different demonstration method is used.

Using fatigue monitoring software, relevant events for Unit 1 and Unit 2 from 6/30/95 through 10/9/05 were analyzed to determine the average CUF per event. Using this data, SNC has shown that the maximum 60-year projected CUF for this location is 0.00006 for Unit 1 and 0.00004 for Unit 2. With a maximum environmental factor for stainless steel from NUREG/CR-5704 of 15.35, the maximum CUF increases to an environmental fatigue adjusted value of 0.00091 for Unit 1 and 0.00065 for Unit 2, which are less than 1.0 and therefore acceptable.

For the period of extended operation, the Accumulator/RHR nozzles will be managed using fatigue monitoring by the Fatigue Monitoring Program (Appendix B.3.38) to ensure that the CUF remains below the established limit. The allowable CUF in the program for the Accumulator/RHR nozzles will be reduced from 1.0000 to 0.0651 to account for the maximum F_{en} value of 15.35 used in this evaluation.

In summary, the TLAA for this location has been demonstrated to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii).

4.3.1.6 Full Structural Weld Overlays (FSWOL) on Pressurizer Spray Nozzles, Safety and Relief Nozzles, and Surge Nozzle

Full structural weld overlays have been installed on the Unit 2 pressurizer spray nozzle, pressurizer safety and relief nozzles, and the pressurizer surge nozzle. FSWOL are also planned to be installed on the corresponding Unit 1 components at the next refueling outage.

Fatigue crack growth analyses using ASME Code Section XI methodology were performed to demonstrate the fatigue qualification at the structural weld overlay regions (Ref. 35). The impact of the addition of structural weld overlay material on the existing primary stress qualification, considering both deadweight and dynamic loadings, was determined to be insignificant. Reconciliation of the existing fatigue evaluation was performed for the limiting locations outside the FSWOL and it was demonstrated that the pressurizer nozzles would still meet the applicable ASME Code Section III requirements. The transient assumptions for this analysis are consistent with the existing stress analyses and the Fatigue Monitoring Program (Appendix B.3.38).

The cycle counting and cycle-based fatigue modules of the Fatigue Monitoring Program (Appendix B.3.38) are not affected by this change. However, the effects of the weld overlays on the program's stress-based module for monitoring the CUF of the pressurizer nozzles is still being evaluated. As an enhancement to the program, prior to the period of extended operation, SNC will evaluate the impact of the FSWOLs on the stress-based fatigue modules for the pressurizer nozzles and, if the existing module is not conservative, revise it so that it continues to provide valid results. The 60-year projected CUF for the limiting surge nozzle location, using the existing SBF module, is currently 0.00004, so there is adequate margin to account for any changes due to the weld overlay.

4.3.1.7 High-Energy Line-Break Postulated Locations Based on Fatigue Cumulative Usage Factor

Nuclear Regulatory Commission (NRC) Branch Technical Position (BTP) MEB 3-1 is the basis for the VEGP criteria for the postulation of high-energy line breaks (HELBs) as described in VEGP UFSAR Section 3.6.2.1.1, with exception of lines that have eliminated postulated breaks based on Leak-Before-Break analysis (see Section 4.7.1). One of the criteria in MEB 3-1 for Class 1 piping is postulating pipe breaks at any intermediate locations where the CUF exceeds 0.1. The NRC staff has determined that this analysis qualifies as a TLAA.

As discussed previously, the original 40-year design cycles are conservative for 60 years of operation at VEGP, except for the feedwater cycling transient and the loss of charging and loss of letdown transients. Therefore, the CLB determinations of intermediate break locations are unaffected, with the possible exception of the Class 1 piping affected by these transients.

For the feedwater cycling transient, the only Class 1 components analyzed for this transient are the steam generators. The main feedwater and auxiliary feedwater nozzles on the steam generators are impacted by the transient, however the attached piping is not Class 1.

Therefore, the postulation of intermediate break points in the feedwater and auxiliary feedwater systems is unaffected.

For the charging line and letdown line transients, monitoring the CUF of the charging nozzles assures that all components in the Class 1 portion of the CVCS System continue to have a CUF less than 1.0. However, without additional review, this does not necessarily lead to the conclusion that the CUF of the components in the Class 1 portion of the CVCS System with a design CUF less than 0.1 will remain below 0.1. For the period of extended operation, the allowable CUF for the charging nozzle is being reduced to 0.01316 to accommodate environmental fatigue effects (see Section 4.3.1.5.4). It is expected that this revised CUF limit for the charging nozzle will ensure the CUF of the Class 1 components in charging and letdown lines with a design CUF less than 0.1 will remain below 0.1.

Prior to the period of extended operation, SNC will ensure the fatigue monitoring limits implemented as part of the Fatigue Monitoring Program (Appendix B.3.38) are adequate to maintain the Class 1 portions of the charging and letdown lines with a design analysis CUF of less than 0.1 below 0.1, consistent with the CLB for postulated intermediate break locations.

4.3.1.8 Conclusion

The VEGP fatigue TLAAs for ASME Class 1 components have been evaluated and shown to remain valid and adequately managed for the period of extended operation, in accordance with the demonstration methods of 10 CFR 54.21(c)(i) and 10 CFR 54.21(c)(iii). Fatigue analyses evaluated include those based on the original Class 1 design transients, analyses of the lower pressurizer head and surge line (IEB 88-11), as well as environmentally-assisted fatigue effects. The Fatigue Monitoring Program (Appendix B.3.38) monitors and tracks cyclic and transient occurrences and their severity, and performs CUF monitoring of selected components to ensure that Class 1 components are maintained within their fatigue design limits.

Prior to the period of extended operation, SNC will ensure the fatigue monitoring limits implemented as part of the Fatigue Monitoring Program (Appendix B.3.38) are adequate to maintain the Class 1 portions of the CVCS System with a design analysis CUF of less than 0.1 below 0.1, consistent with the CLB for postulated intermediate break locations.

As an enhancement to the Fatigue Monitoring Program (Appendix B.3.38) prior to the period of extended operation, SNC will evaluate the impact of the full structural weld overlays applied to the pressurizer nozzles on the stress-based fatigue modules for the pressurizer nozzles and, if the existing module is not conservative, revise it so that it continues to provide valid results.

Table 4.3.1-1 Summary of RCS Design Transients

Operating Conditions	Analyzed Occurrences	Counted ?	Reason Not Counted
RCP startup and shutdown	4000 (1000 each RCP)	Yes	
Heatup and cooldown at 100°F/h (pressurizer cooldown at 200°F/h)	200 (each)	Yes	
Unit loading and unloading between 0 and 15 percent of full power	500 (each)	Yes	
Unit loading and unloading at 5 percent of full power/min	13,200 unloading 11,200 loading	No	The full effect of this event is included in the CBF monitoring of the relevant components, eliminating the need for counting. Also this event does not result in significant fatigue usage[(E)]
Reduced temperature return to power	2000	No*	Expected cycles are a small fraction of allowable[(A), (B)]
Step-load increase and decrease of 10 percent of full power	2000 (each)	No*	Expected cycles are a small fraction of allowable[(A)]
Large step-load decrease with steam dump	200	No*	Expected cycles are a small fraction of allowable[(A)]
Steady-state fluctuations Initial fluctuations Random fluctuations	 1.5×10^5 3.0×10^6	 No No	These events do not result in significant fatigue usage[(E)]
Boron concentration equalization	26,400	No	This event does not result in significant fatigue usage[(E)]
Feedwater cycling	2000	No*	Monitor CUF of Main & Aux. Feedwater Nozzles[(F)]
Loop out of service Normal loop shutdown Normal loop startup	 80 70	 No* No*	Expected cycles are a small fraction of allowable[(A)] VEGP does not operate with a loop out of service; therefore, this event is not expected.

Table 4.3.1-1 (Cont'd) Summary of RCS Design Transients

Operating Conditions	Analyzed Occurrences	Counted ?	Reason Not Counted
Refueling	80	Yes	
Turbine roll test	20	No*	Expected cycles are a small fraction of allowable(A) – No longer performed(D)
Primary side leakage test	200	Yes	
Secondary side leakage test	80	No*	Expected cycles are a small fraction of allowable(A)
Loss of load without immediate reactor trip	80	Yes	
Loss of power	40	Yes	
Partial loss of flow	80	Yes	
Reactor trip from full power With no inadvertent cooldown With cooldown and no SI With cooldown and SI	 230 160 10	 Yes Yes Yes	
Inadvertent RCS depressurization	20	No*	Expected cycles are a small fraction of allowable(A)
Inadvertent startup of an inactive loop	10	No*	Expected cycles are a small fraction of allowable(A) VEGP does not operate with a loop out of service; therefore, this event is not expected.
Control rod drop	80	No*	Expected cycles are a small fraction of allowable(A)
Inadvertent SI actuation	60	Yes	
Excessive feedwater flow	30	No*	Expected cycles are a small fraction of allowable(A)
OBE (5 earthquakes of 10 cycles each)	50 cycles	No*	Expected cycles are a small fraction of allowable(A)

Table 4.3.1-1 (Cont'd) Summary of RCS Design Transients

Operating Conditions	Analyzed Occurrences	Counted ?	Reason Not Counted
Excessive bypass feedwater flow	30	No*	Expected cycles are a small fraction of allowable[A]
RCS cold over-pressurization	10	No*	Expected cycles are a small fraction of allowable[A]
Emergency Conditions			
Small LOCA	5	No*	This event has not occurred, and is not expected[C]
Small steam line break	5	No*	This event has not occurred, and is not expected[C]
Complete loss of flow	5	No*	This event has not occurred, and is not expected[C]
Faulted Conditions			
Reactor coolant pipe break (large LOCA)	1	No*	Not required – Faulted Condition[C]
Large steam line break	1	No*	Not required – Faulted Condition[C]
Feedwater line break	1	No*	Not required – Faulted Condition[C]
RCP locked rotor	1	No*	Not required – Faulted Condition[C]
Control rod ejection	1	No*	Not required – Faulted Condition[C]
Steam generator tube rupture	1	No*	Not required – Faulted Condition[C]
Simultaneous steam line - feedwater line break	1	No*	Not required – Faulted Condition[C]
SSE	1	No*	Not required – Faulted Condition[C]

Table 4.3.1-1 (Cont'd) ***Summary of RCS Design Transients***

Operating Conditions	Analyzed Occurrences	Counted ?	Reason Not Counted
Test Conditions			
Primary side hydrostatic test	10	No*	Expected cycles are a small fraction of allowable(A) – No longer performed(D)
Secondary side hydrostatic test	10	Yes	
Tube leakage test	800	No*	Expected cycles are a small fraction of allowable (A)

* Indicates transient is currently counted by FatiguePro™ software but counting this transient is not required.

A. Expected cycles for 60 years are less than 10% of allowed cycles.

B. This transient assumes load-follow operation; VEGP does not use load-follow operation.

C. In accordance with ASME Section III, emergency and faulted conditions are not included in the design fatigue evaluations.

D. This test is no longer required and no longer performed.

E. Temperature and pressure variations due to this event are very small and/or occur slowly, causing insignificant fatigue contribution; therefore, it is not necessary to explicitly count this transient. (See Ref. 14)

F. CUF of main and auxiliary feedwater nozzles is monitored rather than tracking feedwater cycling.

Table 4.3.1-2 Transients Tracked By Fatigue Monitoring Software

Transient	Cyclic Or Transient Limit	U1 / U2 Transients Counted as of 10/9/05	U1 / U2 Projected 60-year count(A)
RCS heatup	200 heatups at ≤ 100°F/h	31 / 25	77 / 74
RCS cooldown	200 cooldowns at ≤ 100°F/h	30 / 25	75 / 77
Pressurizer heatup	200 pressurizer heatups at ≤ 200°F/h	33 / 25	80 / 74
Pressurizer cooldown	200 pressurizer cooldowns at ≤ 200°F/h	32 / 25	78 / 77
RCS leak tests	200	4 / 2	6 / 3
RCP-1 startup/shutdown	1000	269 / 172	632 / 484
RCP-2 startup/shutdown	1000	259 / 214	609 / 583
RCP-3 startup/shutdown	1000	239 / 188	594 / 525
RCP-4 startup/shutdown	1000	248 / 155	578 / 403
Turbine trip without reactor trip	80 loss of loads	1 / 2	2 / 3
Loss of offsite power	40	2 / 2	3 / 3
Loss of RCS flow in a loop at power	80	1 / 2	2 / 3
Auxiliary spray with $\Delta T > 320°F$	10 auxiliary spray actuations	1 / 1	5 / 4
Plant loading between 0% and 15%	500	95 / 61	200 / 158
Plant unloading loading between 0% and 15%	500	48 / 20	91 / 58
Refueling	80	12 / 10	41 / 36
Secondary side hydrostatic tests S/G-1	10	1 / 1	1 / 2
Secondary side hydrostatic tests S/G-2	10	1 / 1	1 / 2
Secondary side hydrostatic tests S/G-3	10	1 / 1	1 / 2
Secondary side hydrostatic tests S/G-4	10	1 / 1	1 / 2
Charging and Letdown Shutoff (Normal)	Normal Charging Nozzle CUF < 1(C)	0.03 / <0.01	0.06 / 0.01
Charging Trip Prompt Return (Normal)	Normal Charging Nozzle CUF < 1(C)	0.03 / <0.01	0.06 / 0.01
Charging Trip Delayed Return (Normal)	Normal Charging Nozzle CUF < 1(C)	0.03 / <0.01	0.06 / 0.01

Table 4.3.1-2 (Cont'd) Transients Tracked By Fatigue Monitoring Software

Transient	Cyclic Or Transient Limit	U1 / U2 Transients Counted as of 10/9/05	U1 / U2 Projected 60-year count[(A)]
Letdown Trip Prompt Return (Normal)	Normal Charging Nozzle CUF < 1[(C)]	0.03 / <0.01	0.06 / 0.01
Letdown Trip Delayed Return (Normal)	Normal Charging Nozzle CUF < 1[(C)]	0.03 / <0.01	0.06 / 0.01
Charging and Letdown Shutoff (Alternate)	Alternate Charging Nozzle CUF < 1[(D)]	0.04 / 0.06	0.06 / 0.10
Charging Trip Prompt Return (Alternate)	Alternate Charging Nozzle CUF < 1[(D)]	0.04 / 0.06.	0.06 / 0.10.
Charging Trip Delayed Return (Alternate)	Alternate Charging Nozzle CUF < 1[(D)]	0.04 / 0.06	0.06 / 0.10
Letdown Trip Prompt Return (Alternate)	Alternate Charging Nozzle CUF < 1[(D)]	0.04 / 0.06	0.06 / 0.10
Letdown Trip Delayed Return (Alternate)	Alternate Charging Nozzle CUF < 1[(D)]	0.04 / 0.06	0.06 / 0.10
Reactor trip (with no cooldown)	230	65 / 36	128 / 80
Reactor trip (with cooldown and no SI)	160	0 / 0	1[(B)] / 1[(B)]
Reactor trip (with cooldown and SI)	10	1 / 2	2 / 9
Inadvertent safety injection	60	0 / 1	0 / 2
Reduced temperature return to power	2000	0 / 0	1[(B)] / 1[(B)]
Step-load decrease of 10 percent of full power	2000	21 / 16	32 / 26
Step-load increase of 10 percent of full power	2000	21 / 16	32 / 26
Large step-load decrease with steam dump	200	0 / 2	1[(B)] / 3
Feedwater cycling S/G 1	MFW Nozzle CUF < 1[(E)] AFW Nozzle CUF < 1[(E)]	0.02 / 0.01 0.03 / 0.02	0.08 / 0.06 0.08 / 0.06
Feedwater cycling S/G 2	MFW Nozzle CUF < 1[(E)] AFW Nozzle CUF < 1[(E)]	0.02 / 0.02 0.12 / 0.02	0.07 / 0.06 0.26 / 0.06
Feedwater cycling S/G 3	MFW Nozzle CUF < 1[(E)] AFW Nozzle CUF < 1[(E)]	0.02 / 0.01 0.03 / 0.04	0.07 / 0.06 0.07 / 0.13

Table 4.3.1-2 (Cont'd) Transients Tracked By Fatigue Monitoring Software

Transient	Cyclic Or Transient Limit	U1 / U2 Transients Counted as of 10/9/05	U1 / U2 Projected 60-year count[A]
Feedwater cycling S/G 4	MFW Nozzle CUF < 1[E] AFW Nozzle CUF < 1[E]	0.02 / 0.01 0.06 / 0.02	0.07 / 0.06 0.12 / 0.06
Loop out of service Normal loop shutdown Normal loop startup	 80 70	 0 / 0 0 / 0	 1[B] / 1[B] 1[B] / 1[B]
Turbine roll test	20	1 / 1	2 / 2
Secondary side leakage test	80	0 / 0	1[B]/ 1[B]
Inadvertent RCS depressurization	20	0 / 0	1[B]/ 1[B]
Inadvertent startup of an inactive loop	10	0 / 0	1[B]/ 1[B]
Control rod drop	80	1 / 1	2 / 2
Excessive feedwater flow	30	0 / 0	1[B]/ 1[B]
OBE (5 earthquakes of 10 cycles each)	50 cycles	0 / 0	1[B]/ 1[B]
Excessive bypass feedwater flow	30	0 / 0	1[B]/ 1[B]
RCS cold over-pressurization	10	0 / 0	1[B]/ 1[B]
Small LOCA	5	0 / 0	1[B]/ 1[B]
Small steam line break	5	0 / 0	1[B]/ 1[B]
Complete loss of flow	5	0 / 0	1[B]/ 1[B]
Reactor coolant pipe break (large LOCA)	1	0 / 0	1[B]/ 1[B]
Large steam line break	1	0 / 0	1[B]/ 1[B]
Feedwater line break	1	0 / 0	1[B]/ 1[B]
RCP locked rotor	1	0 / 0	1[B]/ 1[B]
Control rod ejection	1	0 / 0	1[B]/ 1[B]
Steam generator tube rupture	1	0 / 0	1[B]/ 1[B]
Simultaneous steam line - feedwater line break	1	0 / 0	1[B]/ 1[B]
SSE	1	0 / 0	1[B]/ 1[B]
Post-LOCA Operation	1	0 / 0	1[B]/ 1[B]

Table 4.3.1-2 (Cont'd) Transients Tracked By Fatigue Monitoring Software

Transient	Cyclic Or Transient Limit	U1 / U2 Transients Counted as of 10/9/05	U1 / U2 Projected 60-year count[(A)]
Primary side hydrostatic test	10	1 / 1	2 / 2
Tube leakage test	800	0 / 0	1[(B)]/ 1[(B)]

Notes:

A. Corrective actions are required any time the 60-year projected value exceeds the limit.

B. Fatigue program software calculated a projected value of zero, however, one cycle is assumed for conservatism.

C. CUF of normal charging nozzle is monitored rather than count loss of charging and loss of letdown cycles.

D CUF of alternate charging nozzle is monitored rather than count loss of charging and loss of letdown cycles.

E. CUF of main and auxiliary feedwater nozzles is monitored rather than count feedwater cycling events.

Table 4.3.1-3 Evaluation of Environmental Effects on Fatigue

Initial Analysis Using Maximum Applicable F_{en} and Design CUF					
Location	**Material**	**Design CUF**	**Max F_{en}**	**Calculated CUF incl EAF effects**	**Allowed CUF Result**
Reactor vessel inlet nozzle	Low alloy steel	0.0758	2.45	0.1857	1.0
Reactor vessel outlet nozzle	Low alloy steel	0.1216	2.45	0.2979	1.0
Reactor vessel lower head to shell juncture	Low alloy steel	0.0166	2.45	0.0407	1.0
Surge line hot leg nozzles	Stainless Steel	0.9500	15.35	14.58	1.0[A]
Charging nozzles	Stainless Steel	0.9900	15.35	15.20	1.0[A]
Safety injection nozzles	Stainless Steel	0.6290	15.35	9.66	1.0[A]
RHR line inlet transition - nozzle	Stainless Steel	0.9500	15.35	14.58	1.0[A]

Final Analysis Using Projected CUF Calculated by FatiguePro[B]					
Location	**U1/U2 60-year projected CUF**	**F_{en} Value[C]**	**Calculated EAF**	**Result**	**Allowed CUF[D]**
Surge line hot leg nozzle	0.00534 / 0.00628	15.35	0.08202 / 0.09642	Pass	0.0651
Alternate charging nozzle	0.05711 / 0.10116	7.6	0.43406 / 0.76881	Pass	0.1316
Normal charging nozzle	0.05631 / 0.00750	7.6	0.42794 / 0.05701	Pass	0.1316
Safety injection nozzle	0.02219 / 0.15049	5.535	0.12280 / 0.83296	Pass	0.1807
RHR line inlet transition - nozzle	0.00006 / 0.00004	15.35	0.00091 / 0.00065	Pass	0.0651

A. Further evaluation required - see “Final Analysis Using Projected CUF.”

B. Projected CUFs used were based on data through 10/9/2005.

C. Maximum F_{en} values were used except for the SI and charging nozzles where a F_{en} value was calculated.

D. Allowed EAF value is 1.000. For evaluating future calculated and projected CUF values that do not account for environmental fatigue, the allowed CUF value accounts for environmental effects by dividing the normal allowable of 1.000 by the F_{en} value.

4.3.2 FATIGUE OF NON-ASME CLASS 1 COMPONENTS

In the evaluation of cracking due to thermal fatigue for in-scope ASME Components outside the reactor coolant pressure boundary (non-Class 1), thermal stresses on piping are considered to bound thermal stresses on other components in the system. The design of ASME III Code Class 2 and 3 piping systems at VEGP incorporates stress reduction factors for determining the acceptability of the piping design with respect to thermal stresses. Those in-scope components that are designed in accordance with ASME B31.1 requirements also incorporate stress reduction factors based upon an assumed number of thermal expansion cycles. In general, 7,000 full-temperature thermal cycles are assumed in the calculation of the thermal expansion stress (S_A), leading to a stress reduction factor of 1.0 in the stress analyses.

SNC evaluated the validity of the assumption of 7,000 full-temperature thermal cycles for 60 years of plant operation. In general, the assumption of 7000 cycles was conservative and the actual temperature changes experienced by most systems were determined to be much less severe than the design full-temperature cycles. In some cases, the evaluation converted “partial cycle” transients where the actual temperature change for the transients are much less severe than the design full-temperature cycles, to equivalent full-temperature thermal cycles (or conversely, convert the full-temperature cycles to an allowable number of partial-temperature cycles).

The ANSI B31.1 Power Piping Code, 1967 Edition, Section 102.3.2, provides the following equation and methodology for mathematically determining the number of equivalent full temperature range changes that result from the number of lesser temperature range changes:

$$N = N_E + r_1^5 N_1 + r_2^5 N_2 + \ldots r_n^5 N_n$$

Where: N = the number of equivalent full temperature cycles,

N_E = number of cycles at full temperature change for which expansion stress has been calculated,

$N_1, N_2 \ldots N_n$ = number of cycles at lesser temperature changes,

$r_1, r_2 \ldots r_n$ = ratio of lesser temperature cycles to the cycle for which the expansion stress has been calculated.

The results of this evaluation indicate that the 7,000 full-temperature thermal cycle assumption is valid and bounding for 60 years of operation. Therefore, the existing fatigue analyses for the non-ASME Class 1 components are valid for the extended term of operation in accordance with 10 CFR 54.21(c)(1)(i).

4.3.3 FATIGUE OF THE REACTOR COOLANT PUMP FLYWHEEL

A calculation was performed for the VEGP RCP flywheels (Ref. 31) that contains an assumption that each pump will be subjected to 6,000 start/stop cycles over a 60 year life. The Fatigue Monitoring Program (Appendix B.3.38) limits each RCP to 1,000 start/stop cycles, and 60-year projections currently indicate 632 pump starts at the end of 60 years of operation. Therefore, the 6,000 start/stop cycles remain bounding for 60 years of operation. Therefore, fatigue analysis of the reactor coolant pump flywheels are demonstrated to be valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i)).

4.3.4 FATIGUE OF REACTOR VESSEL SUPPORTS

The Westinghouse Generic Technical Report WCAP 14422, Revision 2a, (Ref 15) identifies fatigue of reactor vessel supports as a potential TLAA if the supports of the reactor vessel were constructed in accordance with the 1963 version of the AISC Code. In the SER for this WCAP, the NRC has indicated that licensees must ensure that a later version of the AISC Code was used. The design of VEGP used the 1969 version of the AISC Code, and therefore, the existing analysis is demonstrated to be valid for the extended term of operation in accordance with 10 CFR 54.21(c)(1)(i).

4.3.5 FATIGUE OF STEAM GENERATOR SECONDARY MANWAY AND HANDHOLE BOLTS

Westinghouse performed a fatigue calculation for steam generator secondary manway and handhole bolts that assumed the same transients used for Class 1 component fatigue evaluations. That calculation resulted in a qualified life for the manway bolts of only 20 years. In 1993, it was determined that after Low-Temperature Rerate, the qualified life of the manway bolts would be reduced to 14.5 years (Ref. 39). A new secondary side manway and handhole bolts fatigue evaluation was performed based on revised cycles applicable to 40 years of operation to qualify the bolts for the current operating period with rerating. The 40-year secondary side manway bolt CUF based on revised cycles for 40 years with rerate is 0.997, and is 0.724 for the handhole bolts. SNC elected to periodically replace secondary manway and handhole bolts at 30 years of service life in lieu of using fatigue monitoring.

SNC will continue to ensure that the design limit of the bolts is not exceeded. During the period of extended operation, SNC will be periodically replacing both secondary side manway bolts and handhole bolts under the Bolting Integrity Program (Appendix B.3.2) to manage fatigue. The manway bolts have not previously been replaced and are scheduled for replacement at 30 years of service life during the spring outages in 2017 and 2019 for Units 1 and 2, respectively. The handhole bolts were replaced in1996 and 1998 for units 1 and 2, respectively, and are scheduled to be replaced again during the spring outages in 2026 and 2028 for Units 1 and 2, respectively.

Therefore the steam generator secondary manway and handhole bolt fatigue is adequately managed for the period of extended operation by the Bolting Integrity Program (demonstration in accordance with10 CFR 54.21(c)(1)(iii)).

4.3.6 FATIGUE OF REACTOR VESSEL INTERNALS

A fatigue analysis of the reactor vessel internals was not required when VEGP was originally designed. However, as part of rerating, Westinghouse performed a fatigue calculation for reactor vessel internals that assumed the same cycles used for Class 1 component fatigue evaluations and resulted in CUFs less than 1 for all subcomponents evaluated. Since the analysis utilized the same design transients as the Class 1 component evaluations, the evaluation of the ASME Class 1 piping and component design transient cycles (Section 4.3.1.1) is also applicable to the reactor vessel internals. The design cycles for the transients applicable to the reactor vessel internals were shown to be conservative, therefore the reactor vessel fatigue analysis remain valid for the period of extended operation (demonstration in accordance with 10 CFR 54.21 (c)(1)(i)).

4.4 ENVIRONMENTAL QUALIFICATION OF EQUIPMENT

The NRC has established environmental qualification (EQ) requirements in 10 CFR Part 50 Appendix A and in 10 CFR 50.49. The EQ program for VEGP has been established to demonstrate that certain electrical components are qualified to perform safety functions in the harsh environment following a DBA. Elements of the proof of qualification involve the original 40 year license period. Hence the qualification reports and calculations that comprise the EQ Program meet the definition of a TLAA. In general, SNC did not establish qualified lives for the components within the EQ Program longer than the original 40 year license period.

The environmental qualification of mechanical equipment is addressed through the stringent selection of materials for use under adverse environmental conditions. This selection is supported by partial type testing and materials analysis and evaluation to confirm the adequacy of the materials used.

As a result of this application, no additional components will be added to the VEGP EQ Program. Qualified service lives for the EQ components have already been determined and are tracked to determine when a component is nearing the end of its service life. For those components that are nearing the end of their qualified service life, the EQ Program has provisions for the components to be re-evaluated for longer service, refurbished, requalified, or replaced. The EQ Program at VEGP is a proceduralized program in compliance with Appendix B of 10 CFR Part 50 that receives routine quality assurance audits. This program will be continued through the period of extended operation (Appendix B.3.37), hence the TLAAs will be managed by an Aging Management Program in accordance with 10 CFR 54.21(c)(1)(iii).

A discussion of the EQ component reanalysis attributes (analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria and corrective action) is provided in the program discussion (Appendix B.3.37).

4.5 CONCRETE CONTAINMENT TENDON PRE-STRESS

The VEGP containment structure consists of a prestressed reinforced concrete cylinder and hemispherical dome. The prestressing of the containment is achieved by a two-way post-tensioning system consisting of circumferential hoop tendons and two groups of inverted U-shaped tendons. The prestressing tendons in prestressed concrete containments lose their prestressing forces with time due to creep and shrinkage of concrete, and relaxation of the prestressing steel. Loss of tendon prestress is a time limited aging analysis (TLAA), therefore the adequacy of the prestressing forces is reviewed for the period of extended operation.

Tendon surveillance performed under the Inservice Inspection Program - IWL (Appendix B.3.30) inspects a 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 will remain above minimum required values (MRVs) for the succeeding inspection interval. The program also recalculates the regression analysis trend lines of these two groups, based on individual tendon forces consistent with IN 99-10 (i.e., using individual-tendon data rather than averages), to confirm whether average prestresses are expected to remain above their minimum required values (MRVs) for the remainder of the licensed operating period.

The regression analysis was extended to 60 years (Reference 38), and demonstrated that prestress in both the vertical and horizontal (“hoop”) tendon groups should remain above the applicable minimum required values for at least 60 years of operation; and that all tendons should therefore maintain their design basis function for the extended licensed operating period without retensioning. Similarly, no individual-tendon data from the “common tendons” (one vertical and one horizontal, whose prestress is measured at each surveillance), or from the other sample tendons tested to date, show a loss of prestress sufficient to indicate a possible need to retension for at least 60 years.

Consistent with 10 CFR 54.21(c) (1), option (ii), acceptable losses in containment tendon prestress have been projected to the end of the period of extended operation.

The following Tables and Figures are attached to document the results:

Sequence No.	Table or Figure No.	Description
1	Table 4.5-1	Unit 1 Inverted U Vertical Tendon Data
2	Table 4.5-2	Unit 2 Inverted U Vertical Tendon Data
3	Table 4.5-3	Unit 1 Horizontal (Shell) Hoop Tendon Data
4	Table 4.5-4	Unit 2 Horizontal (Shell) Hoop Tendon Data
5	Table 4.5-5	Unit 1 Dome Hoop Tendon Data
6	Table 4.5-6	Unit 2 Dome Hoop Tendon Data
7	Table 4.5-7	Summary of Tendons Data
8	Figure 4.5-1	Unit 1 Vertical Tendons
9	Figure 4.5-1a	Unit 1 Vertical Baseline Tendon V18-94
10	Figure 4.5-2	Unit 1 Shell Hoop Tendons
11	Figure 4.5-2a	Unit 1 Shell Hoop Baseline Tendon H-83
12	Figure 4.5-3	Unit 1 Dome Hoop Tendons
13	Figure 4.5-4	Unit 2 Vertical Tendons
14	Figure 4.5-4a	Unit 2 Vertical Baseline Tendon V20-92
15	Figure 4.5-5	Unit 2 Shell Hoop Tendons
16	Figure 4.5-5a	Unit 2 Shell Hoop Baseline Tendon H-99
17	Figure 4.5-6	Unit 2 Dome Hoop Tendons

Table 4.5-1 Unit 1 Inverted U Vertical Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1986	0	INITIAL AVG	1572	
		V18-94*	1523	
1987	1	V18-94*	1508	1506
		V4-108	1587	1506
		V42-144	1575	1506
		V58-128	1553	1506
1989	3	V18-94*	1456	1495
		V77-35	1552	1495
		V13-99	1505	1495
		V31-81	1518	1495
2000	14	V18-94*	1463	1481
		V70-116	1586	1481
		V74-112	1530	1481
2010	24			1476
2020	34			1473
2030	44			1471
2040	54			1469

* Baseline (Common) Tendon

Table 4.5-2 Unit 2 Inverted U Vertical Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1988	0	INITIAL AVG	1557	
		V20-92*	1519	
1991	3	V20-92*	1408	1478
		V11-101	1514	1478
		V13-99	1464	1478
1995	7	V18-94	1474	1471
		V20-92*	1455.5	1471
		V26-86	1502	1471
		V69-117	1455	1471
2005	17	V20-92*	1444	1427.6
		V21-91	1491	1411.5
		V56-130	1549	1500.3
2015	27			1459
2025	37			1456
2035	47			1454
2045	57			1453

* Baseline (Common) Tendon

Table 4.5-3 Unit 1 Horizontal (Shell) Hoop Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1986	0	INITIAL AVG	1556	
		H-83*	1588	
1987	1	H-88	1629	1484
		H-139	1589	1484
		H-14	1629	1484
		H-83*	1611	1484
		H-45	1617	1484
		H-69	1650	1484
		H-126	1658	1484
		H-49	1585	1484
1989	3	H-6	1562	1468
		H-7	1567	1468
		H-18	1579	1468
		H-23	1529	1468
		H-83*	1563	1468
		H-58	1558	1468
		H-73	1569	1468
		H-110	1519	1468
2000	14	H-83*	1519.5	1446
		H-30	1584.5	1446
		H-13	1534.5	1446

Table 4.5-3 (Cont'd) Unit 1 Horizontal (Shell) Hoop Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
2010	24			1438
2020	34			1433
2030	44			1427
2040	54			1426

* Baseline (Common) Tendon

Table 4.5-4 Unit 2 Horizontal (Shell) Hoop Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1988	0	INITIAL AVG	1543	
		H-99*	1540	
1991	3	H-31	1442	1451
		H-36	1483	1451
		H-71	1511	1451
		H-99*	1439	1451
		H-103	1493	1451
1995	7	H-26	1469.5	1439
		H-46	1473.5	1439
		H-64	1537	1439
		H-99*	1467	1439
		H-114	1507.5	1439
2005	17	H-66	1478	1462
		H-99*	1458	1424.5
		H-111	1450	1402.5
2015	27			1421
2025	37			1417
2035	47			1414
2045	57			1411

* Baseline (Common) Tendon

Table 4.5-5 Unit 1 Dome Hoop Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1986	0	INITIAL AVG	1560	
		H-145	1516	
1987	1	H-149	1606	1494
		H-151	1567	1494
1989	3	H-145	1520	1484
2000	14	H-148	1517.5	1470
2010	24			1465
2020	34			1462
2030	44			1459
2040	54			1457

Table 4.5-6 Unit 2 Dome Hoop Tendon Data

Calendar Year	Year After SIT	Tendon No.	Measured Average Tendon Force (Kips)	Predicted Average Tendon Force (Kips)
1988	0	INITIAL AVG	1572	
		H-74	1549	
1991	3	H-155	1488	1492
		H-163	1523	1492
1995	7	H-74	1488.5	1485
2005	17	H-159	1426	1477
2015	27			1473
2025	37			1470
2035	47			1468
2045	57			1467

Table 4.5-7 Summary of Tendons Data

Tendon Type	Total Number of Tendons	Minimum Required Values (MRV)	60 Year Trend Line Values (TLV)		Conclusion
		Kips/Tendon	Kips/ Tendon		
			Unit 1	Unit 2	
Vertical	74	1404	1526	1478	60 Yr TLV Greater Than MRV
Dome Hoop	27	1370	1548	1479	60 Yr TLV Greater Than MRV
Horizontal (Shell) Hoop	141	1336	1578	1478	60 Yr TLV Greater Than MRV

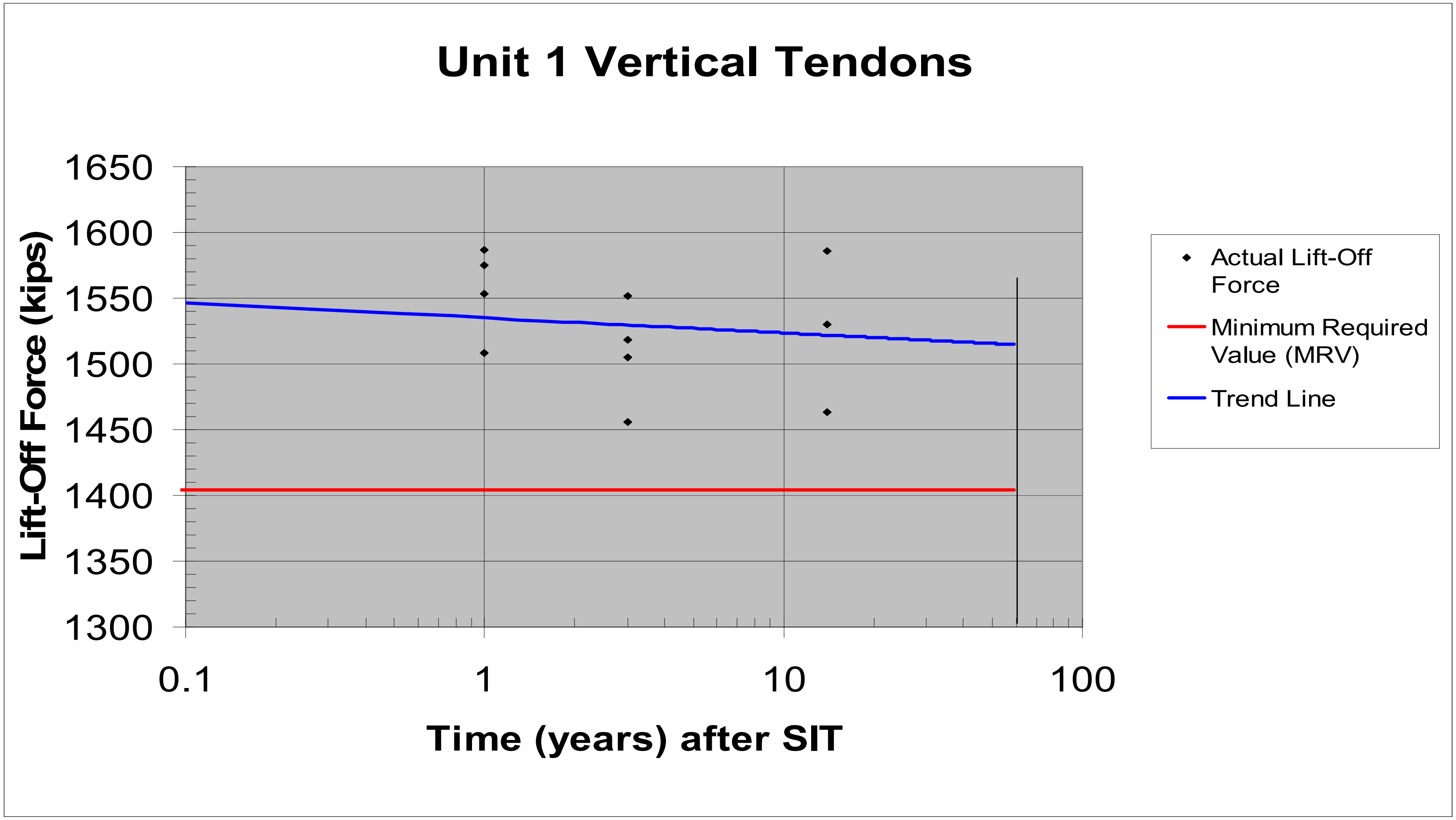

Figure 4.5-1 Unit 1 Vertical Tendons

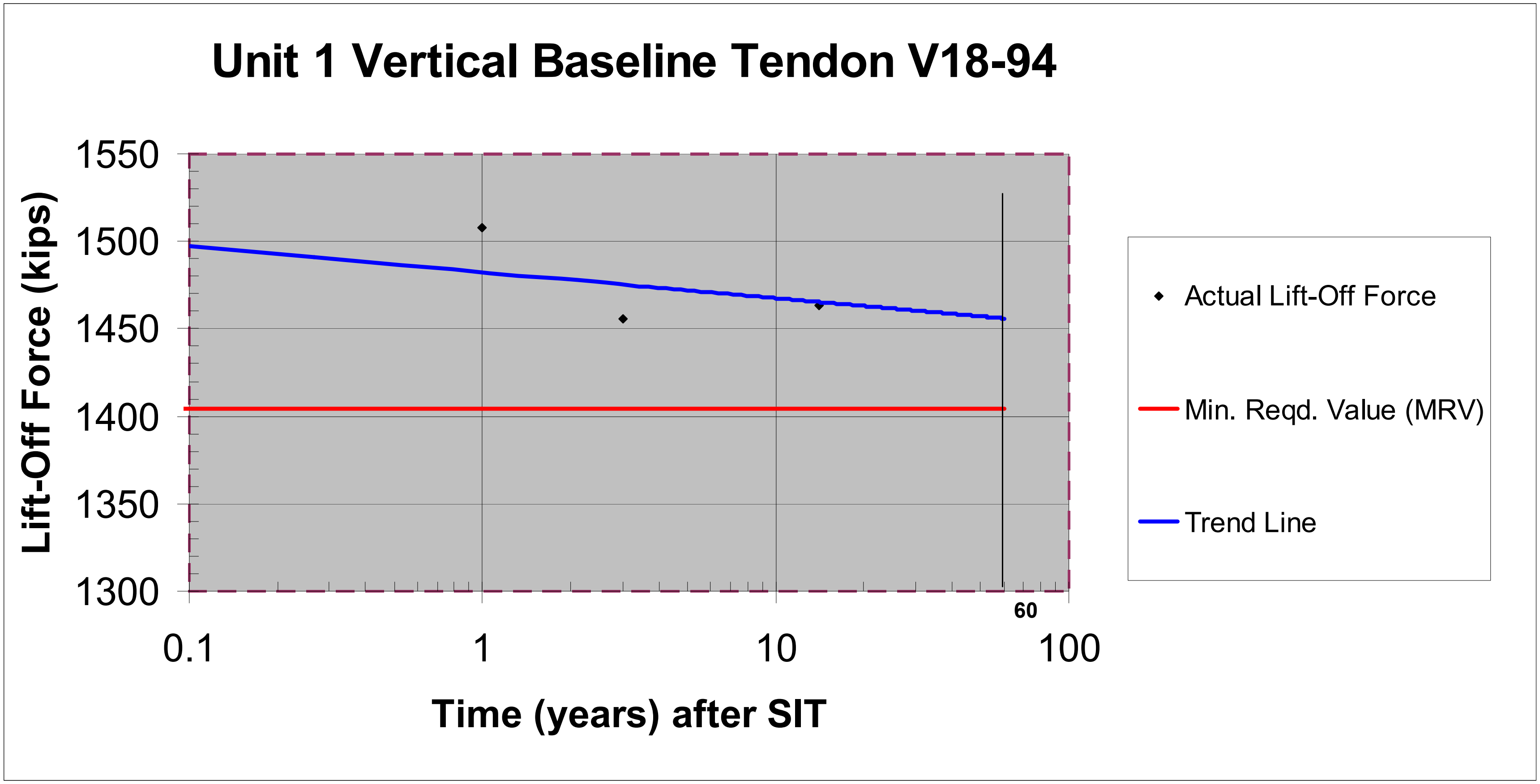

Figure 4.5-1a Unit 1 Vertical Baseline Tendon V18-94

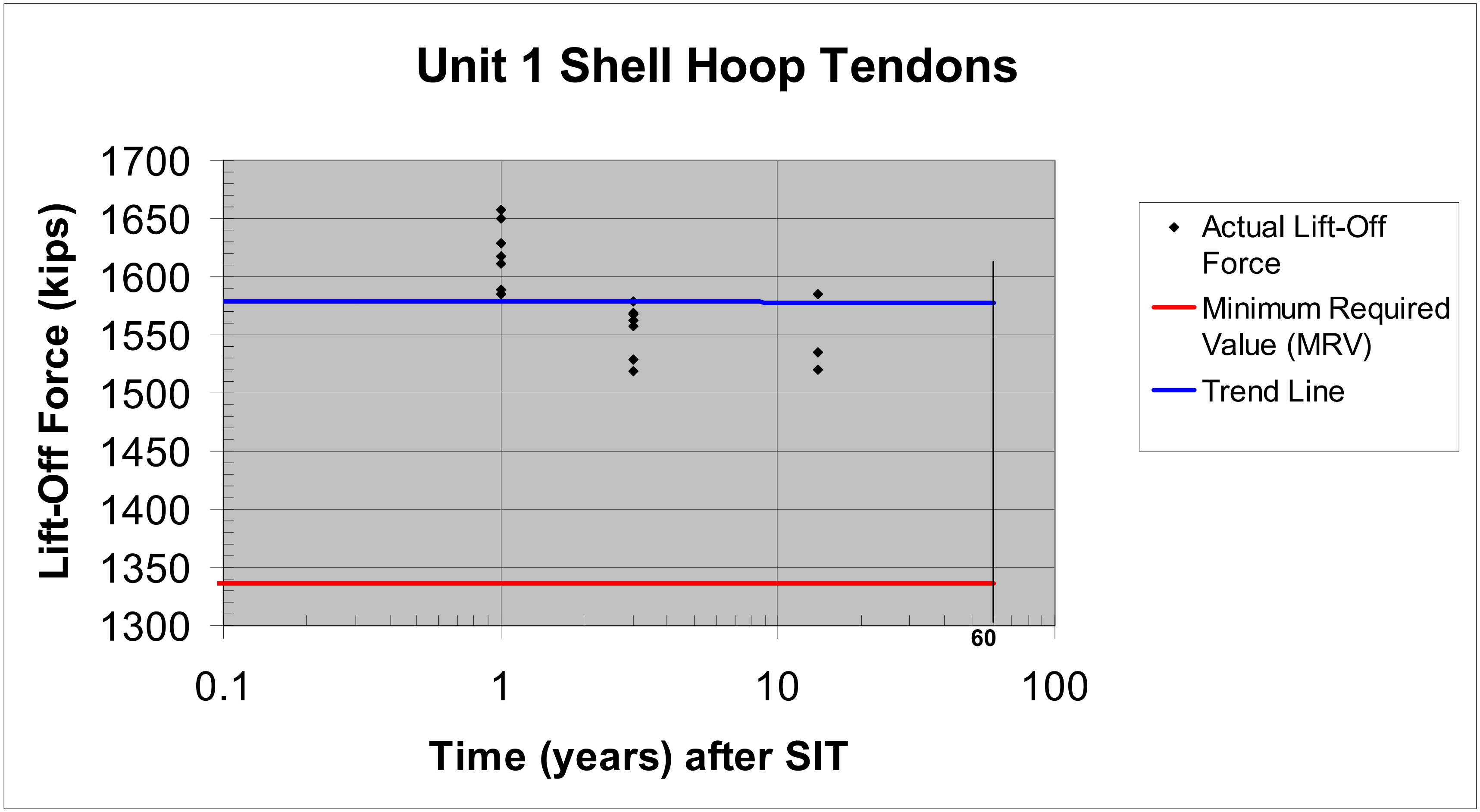

Figure 4.5-2 Unit 1 Shell Hoop Tendons

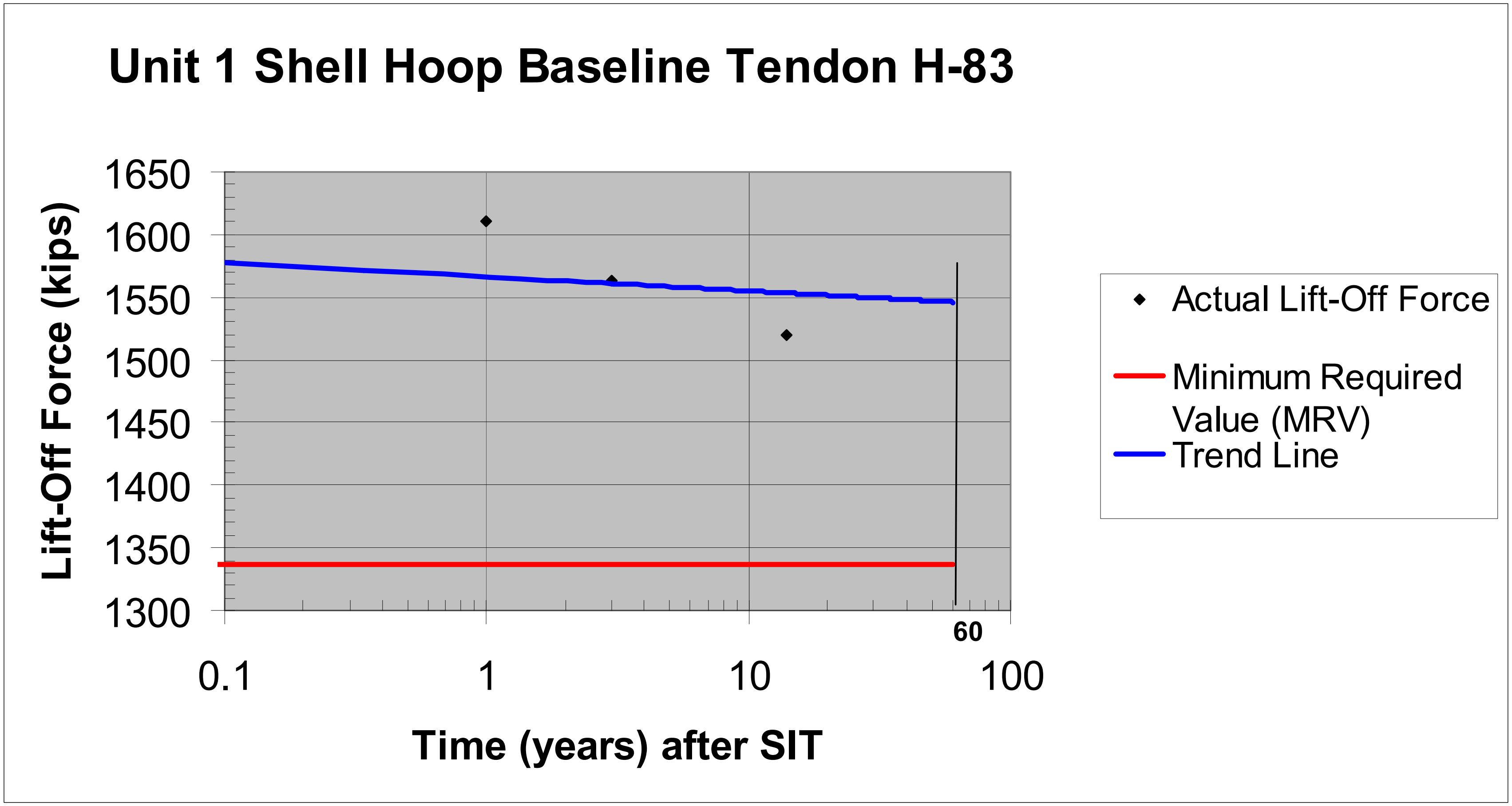

Figure 4.5-2a Unit 1 Shell Hoop Baseline Tendon H-83

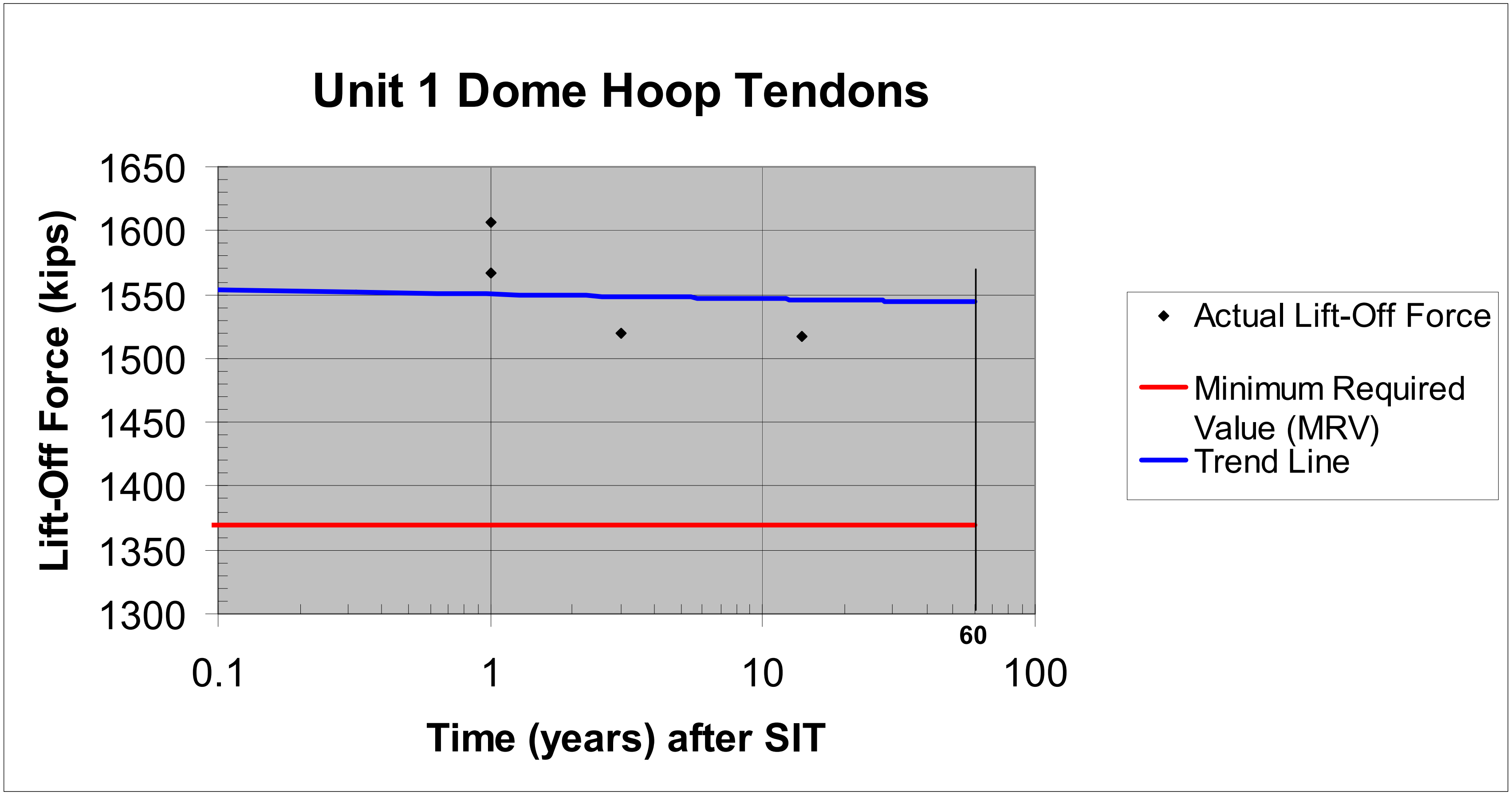

Figure 4.5-3 Unit 1 Dome Hoop Tendons

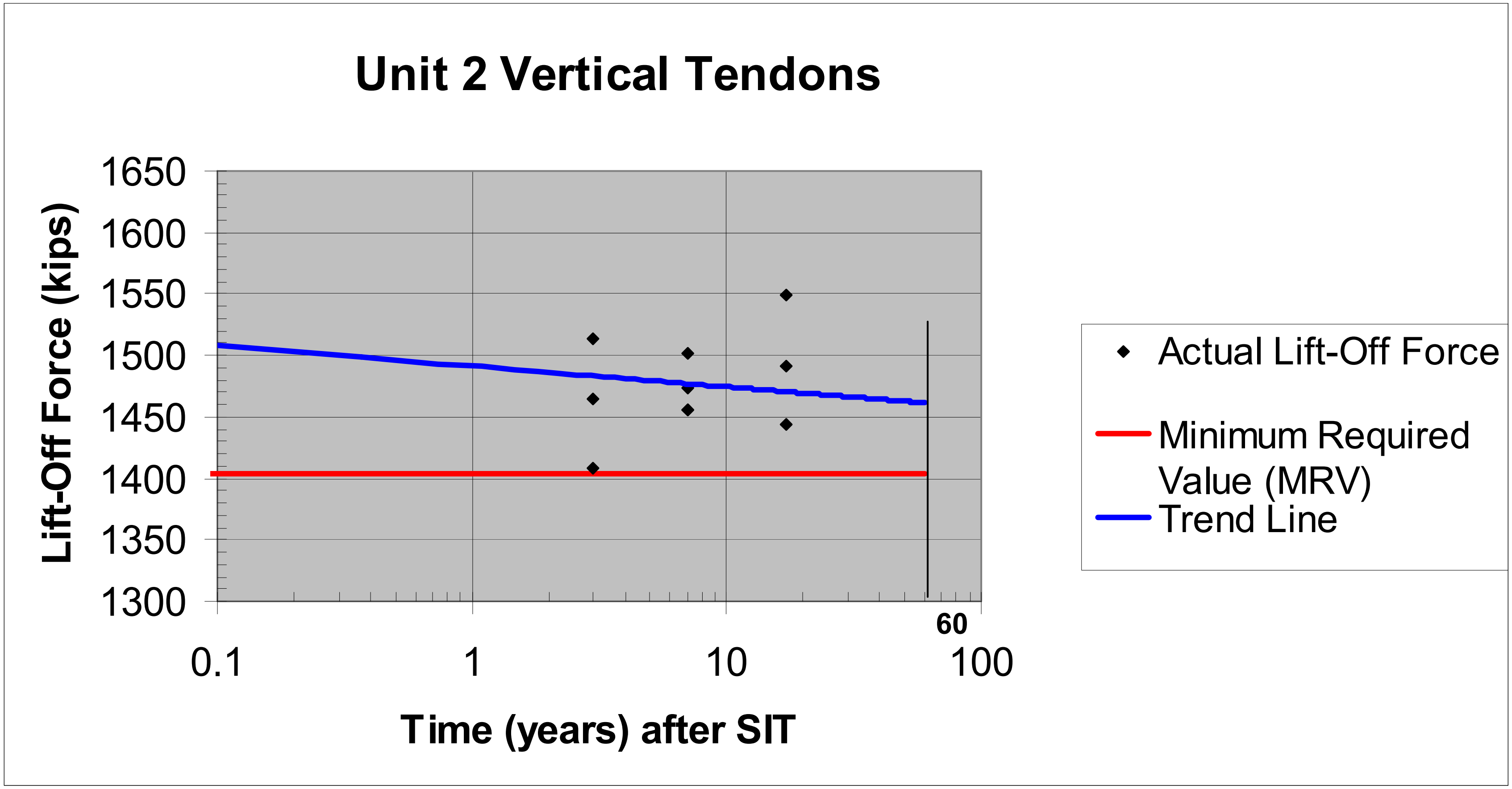

Figure 4.5-4 Unit 2 Vertical Tendons

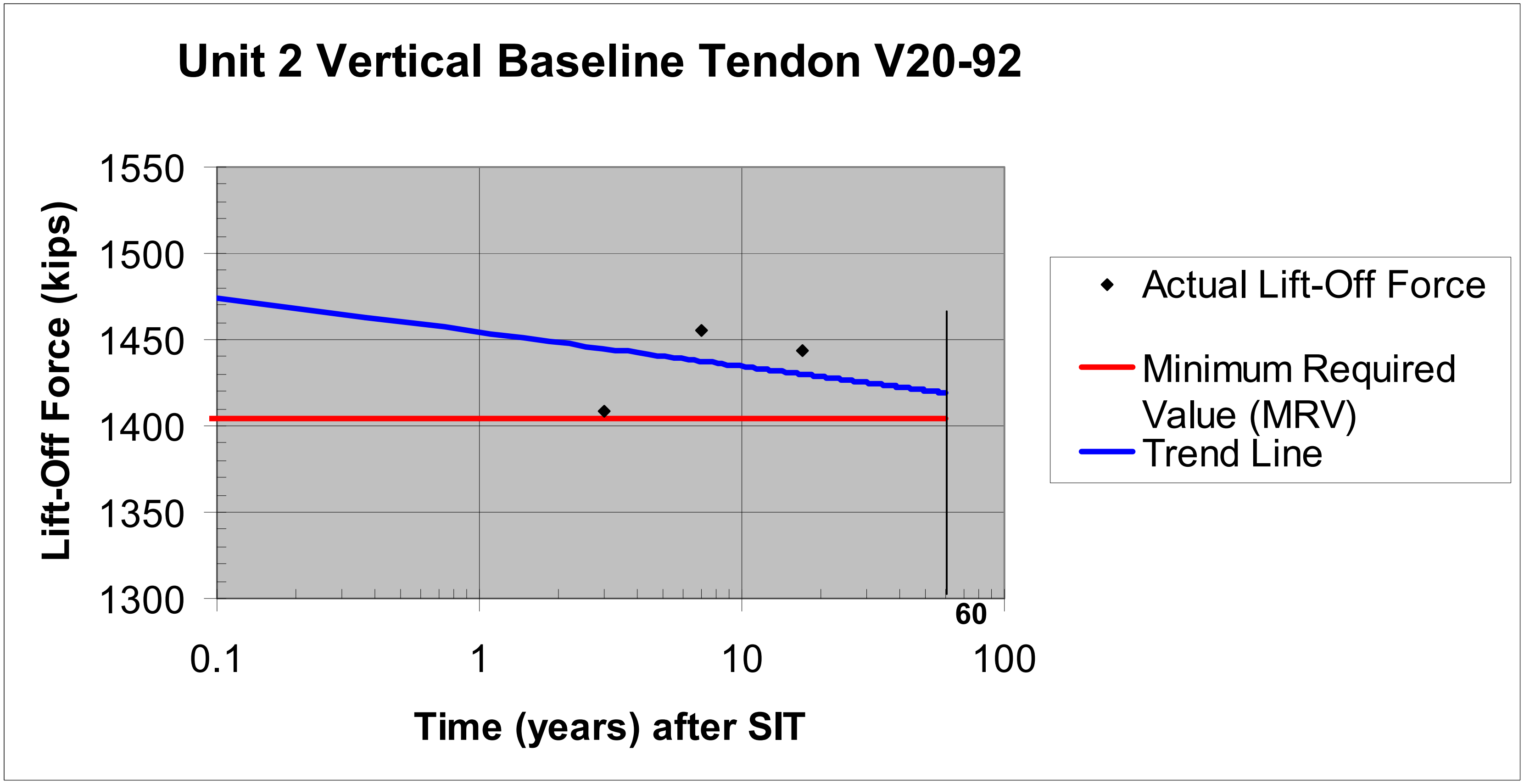

Figure 4.5-4a Unit 2 Vertical Baseline Tendon V20-92

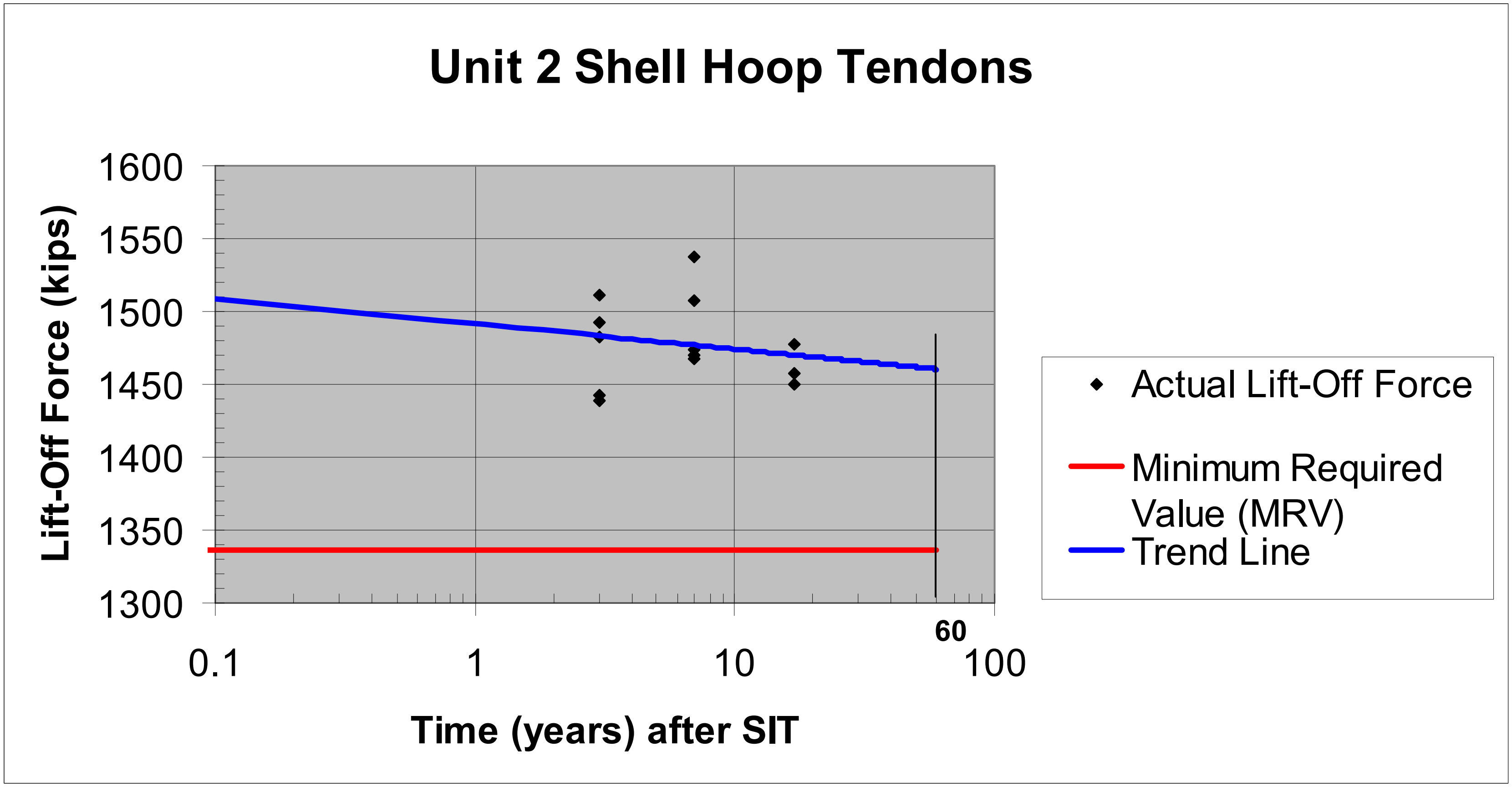

Figure 4.5-5 Unit 2 Shell Hoop Tendons

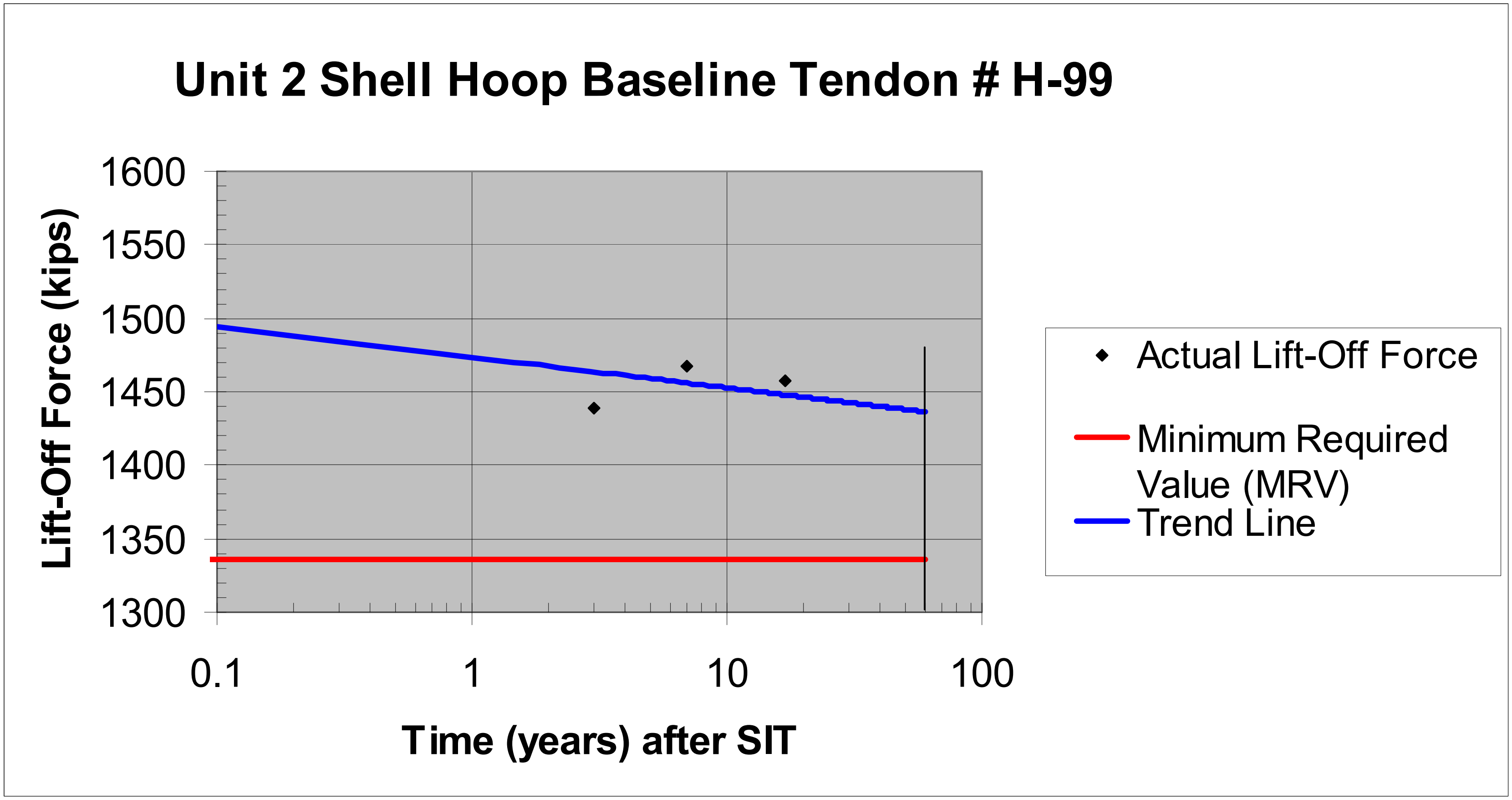

Figure 4.5-5a Unit 2 Shell Hoop Baseline Tendon # H-99

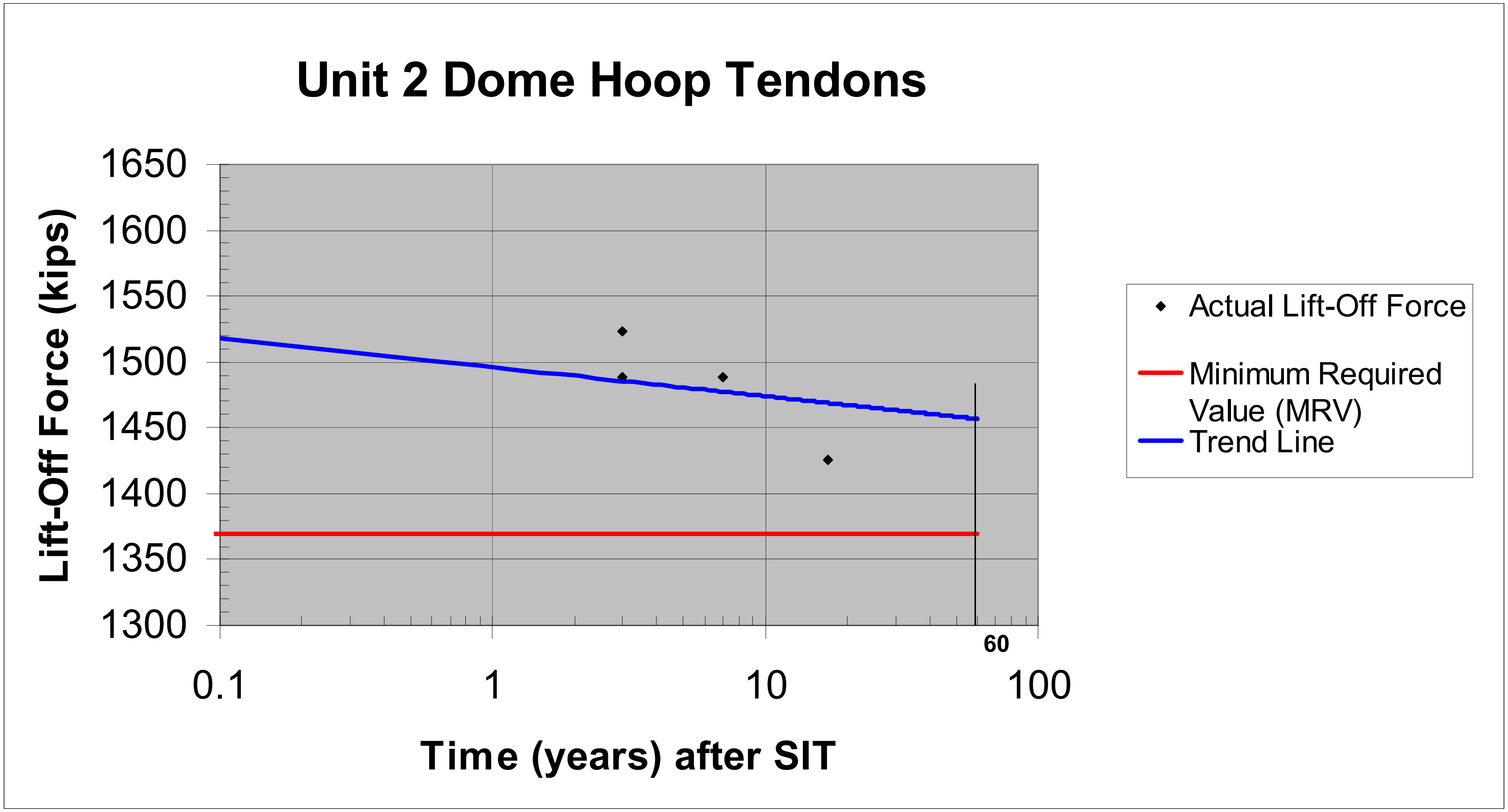

Figure 4.5-6 Unit 2 Dome Hoop Tendons

4.6 PENETRATION LOAD CYCLES

A fatigue analysis was required for some of the VEGP containment penetrations and those analyses qualify as TLAAs. SNC reviewed the transient assumptions for those evaluations against the transient assumptions for Class 1 component fatigue and determined that the penetration fatigue analyses are adequate as-is and do not require updating for License Renewal (demonstration in accordance with 10 CFR 54.21(c)(1)(i)). (Refs. 28, 29, and 30)

The number of transients assumed for the penetrations is bounded by the number of transients assumed for Class 1 piping. Per Section 4.3.1 of this application, the 40-year design cycles are maintained as the 60-year design cycles, except that SNC credits CUF monitoring of the main and auxiliary feedwater nozzles rather than monitoring feedwater cycling events, and SNC credits CUF monitoring of the charging nozzles rather than monitoring of loss of charging and loss of letdown events.

The penetration fatigue calculations do not assume the number of feedwater cycles. Only one penetration fatigue calculation considers the number of loss of charging or loss of letdown events in calculating CUF, and SNC has determined that none of the cycles assumed in that fatigue analysis will be exceeded within the period of extended operation.

4.7 OTHER PLANT SPECIFIC ANALYSES

4.7.1 LEAK-BEFORE-BREAK ANALYSIS

Plant specific leak-before-break (LBB) analyses have been performed for both units of VEGP and are summarized in the UFSAR in Section 3.6.1. These analyses provide the technical justification for elimination of postulated breaks in the reactor coolant loop (RCL) piping (except for the Unit 1 accumulator and residual heat removal branch connections) and pressurizer surge line from the structural design basis.

Westinghouse completed the LBB analyses for Plant Vogtle in several reports as given in References 16 through 22.

The RCL analysis (WCAP-10551) was incorporated into the original Final Safety Analysis Report and evaluated by NRC in NUREG-1137, the Safety Evaluation Report for Plant Vogtle. WCAPs-11531, 11583, and 11589 were submitted to NRC for review and the NRC accepted the methodology and the results of these WCAPs through Supplement Number 7 to NUREG-1137, issued in January 1988.

The aging effect that is addressed in these analyses is cracking. Specifically, leak-before-break crack stability evaluations were performed for enveloping critical locations. The enveloping critical locations were determined based on loading, pipe geometry, and fracture toughness considerations. A fatigue crack growth analysis was also carried out to demonstrate the fatigue crack growth is negligible. Assumptions in these analyses that have a potential basis in the original 40-year term of operation are the fracture toughness properties for cast austenitic stainless steel (CASS) materials (due to thermal aging consideration) and the design transients' cumulative cycles.

For license renewal, SNC performed a TLAA evaluation of the primary loop analyses. SNC determined that no updates of the pressurizer surge line and Unit 2 RHR line LBB analyses were required for license renewal, since these do not contain CASS materials and since the transients assumed for 40 years are bounding for 60 years (see Section 4.3 of the VEGP LRA). SNC determined that the RCL and the Unit 2 accumulator line analyses should be updated to account for the extended term, since CASS materials are present.

At the request of SNC, Westinghouse created an addendum to WCAP-10551 (Ref. 23), containing an analysis of the RCL to account for the addition thermal aging of the CASS materials for the period of extended operation. Westinghouse issued Addendum 1 in December 2005. The addendum is a Westinghouse Proprietary Class 2 document. The analysis accounts for the effects of thermal aging degradation of the CASS materials due to 60 years of operation. Using faulted loads, the analysis demonstrates that a margin of at least 2 exists between the critical flaw and the flaw having a leak rate of 10 gallons per minute (the detectable leakage flow). A margin of 10 exists between the calculated leak rate from the detectable leakage locations, and the detectable leakage flaw is stable using the faulted loads. As required by action item 10 of the NRC Final Safety Evaluation Report for WCAP-14575-A, a margin on loads of 1.4 is satisfied. No CASS material for VEGP Unit 1 and 2 primary loop piping has been replaced; therefore, the second component of action item 10 is not applicable to VEGP.

At the request of SNC, Westinghouse created an addendum to WCAP-11583 (Ref. 24), containing an analysis of the Unit 2 accumulator line to account for the addition thermal aging of the CASS materials for the period of extended operation and issued Addendum 1 in July 2006. The addendum is a Westinghouse Proprietary Class 2 document. The analysis accounts for the effects of thermal aging degradation of the CASS materials due to 60 years of operation. Using faulted loads, the analysis demonstrates that a margin of at least 2 exists between the critical flaw and the flaw having a leak rate of 10 gallons per minute (the detectable leakage flow). A margin of 10 exists between the calculated leak rate from the detectable leakage locations, and the detectable leakage flaw is stable using the faulted loads. As required by action item 10 of the NRC Final Safety Evaluation Report for WCAP-14575-A, a margin on loads of 1.4 is satisfied. No CASS material for the VEGP Unit 2 accumulator line has been replaced; therefore, the second component of action item 10 is not applicable to VEGP.

In conclusion, the analyses for the Unit 2 RHR line and pressurizer surge line were reviewed and determined to be acceptable as-is for the extended license term (demonstration in accordance with 10 CFR 54.21(c)(1)(i)). The analyses for the primary coolant loops and the Unit 2 accumulator line have been evaluated and updated to address operation through 60 years (demonstration in accordance with 10 CFR 54.21(c)(1)(ii)).

4.7.2 FUEL OIL STORAGE TANK CORROSION ALLOWANCE

VEGP UFSAR Section 9.5.4.2.1.1 states that the Diesel Fuel Oil Storage Tanks are not provided with cathodic protection; therefore, a liberal corrosion allowance of 1/8 inch has been provided. SNC discussed the corrosion allowance on the Fuel Oil Storage tanks with the NRC. Georgia Power’s response to NRC SER Open Item 10 for the UFSAR proved the point that there is sufficient corrosion allowance in the buried fuel oil storage tanks and associated piping given an assumed failure size in the coatings of the equipment. That response uses 40 years as the duration for the corrosion allowance. Substituting 60 years into the calculations indicates that the corrosion allowance is not expected to be exceeded during the extended operational life of the plant. In this case, the soils analysis shows that the piping will not be adversely affected by corrosion (from the outside into the tank).

For the period of extended operation, SNC will manage loss of material due to corrosion on the exterior of the tank (exposed to soil) with the Buried Piping and Tanks Aging Management Program (Appendix B.3.4).

The Buried Piping and Tanks Aging Management Program addresses the aging effect of corrosion for these components - demonstration in accordance with 10 CFR 54.21(c)(1)(iii).

4.7.3 STEAM GENERATOR TUBE, LOSS OF MATERIAL

VEGP UFSAR Section 5.4.2 describes allowances for erosion and corrosion that are partially based upon a measured loss of material rate for 40 years. The allowance for erosion and corrosion is much less than the allowed loss of material in the Steam Generator Program. The addition of 50% to the loss of material allowances to account for 60 years of operation has been determined to have no significant effect upon the analysis.

The nominal tube wall thickness is 0.040”. The Steam Generator Program – Tube Integrity (Appendix B.3.28) requires steam generator tubes be plugged if they have a 40% degradation from the nominal wall thickness (0.040*.4 = 0.016 or a wall thickness less than 0.024”). Based on the results of specific analysis for allowable tube wall thinning for the Vogtle Model F steam generator tubes under normal operating and accident loadings, a minimum wall thickness of 0.014 inch is necessary to satisfy the stress limits of Regulatory Guide 1.121.

The minimum inspection–acceptable wall thickness for new tubes is 0.039”. The assumed general wall loss due to corrosion and erosion over 40 years is 3 mils, which reduces the tube wall thickness to 0.036”. The corrosion rate of 3 mils is based on a conservative weight-loss rate for Inconel tubing in flowing 650°F primary side reactor coolant fluid. The weight loss, when equated to a thinning rate and projected over a 40-year design objective with appropriate reduction after initial hours, is equivalent to 0.083-mils thinning. The assumed corrosion rate of 3 mils allows a conservative 2.917 mils for general corrosion thinning on the secondary side. Increasing the assumed corrosion rate by 50% from 3 mils to 4.5 mils has no effect on tube plugging criteria.

Therefore, the loss of material aging effect this TLAA considers will be adequately managed during the period of extended operation by the Steam Generator Program – Tube Integrity, and demonstration is made in accordance with 10 CFR 54. 21(c)(1)(iii).

4.7.4 COLD OVERPRESSURE PROTECTION SYSTEM

As described in VEGP UFSAR Section 5.2.2.10, VEGP has a cold-overpressure mitigation system. When the RCS is at temperatures below approximately 350°F, it is opened to the Residual Heat Removal (RHR) System for the purposes of removing residual heat from the core, providing a path for letdown to the purification subsystem, and controlling the RCS pressure when the plant is operating in a water solid mode. The RHR System is provided with self-actuated water relief valves to prevent overpressure in this relatively low design pressure system caused either within the system itself or from transients transmitted from the RCS. The RHRS relief valves mitigate pressure transients originated in the RCS to maximum pressure values determined by the relief valve set pressure.

The low design pressure RHR System is normally isolated from the high design pressure RCS during reactor power operation at temperatures above approximately 350°F by two isolation valves in series. Therefore, the RHR System can be inadvertently isolated from the RCS by these same isolation valves. The pressurizer power-operated relief valves (PORVs) and associated logic provide overpressure mitigation for those transients which might occur, if the

RHR System isolation valves were inadvertently closed. The PORV logic is manually armed at the system setpoint.

Two pressurizer PORVs are each supplied with actuation logic. The logic for each PORV continuously monitors RCS temperature and pressure, converts an auctioneered RCS temperature to the Appendix G allowable pressure, and then compares the allowable pressure to the actual RCS pressure. As the actual RCS pressure approaches the allowable pressure, a main control board alarm is annunciated. If the RCS pressure continues to increase, an actuation signal is transmitted to a PORV and the valve opens to mitigate the transient.

The setpoints for the pressurizer PORVs and arming temperature are developed in conjunction with the P-T curves using the NRC-approved methodology specified in Technical Specification 5.6.6 (Ref. 32) and are specified in the Pressure-Temperature Limits Report (PTLR). The current limits for these cold overpressure protection systems (COPS) setpoints are based on the 36 EFPY steady-state curves (in the PTLR), which are beltline conditions and are not compensated for pressure differences between the pressurizer transmitter and the reactor midplane/beltline or for instrument inaccuracies. These setpoints include an allowance for the 50°F thermal transport effect for heat injection transients. A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints. That calculation is a TLAA.

Each time the P-T limit curves are revised (see Section 4.2.5), the impact on the COPS setpoints is evaluated to ensure the functional requirements can be met. The P-T curves have been projected through the period of extended operation; however, operational needs will not require use of these curves before the period of extended operation. As described in the PTLR, the Reactor Vessel Surveillance Program (Appendix B.3.25) updates the P-T limit curves considering the data gained from capsules SNC pulls, and the content and update of the PTLR is in accordance with the VEGP Technical Specification 5.6.6. The P-T limit curves and the associated COPS setpoints will continue to be updated as operational needs dictate to bound the current level of neutron embrittlement (i.e., EFPY) for the unit. Therefore, this TLAA demonstration is made in accordance with 10 CFR 54.21(c)(1)(ii) and (iii).

4.8 GENERAL REFERENCES

1. NEI 95-10, Revision 6, “Industry Guidance for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” June 2005.

2. NUREG-1800, Revision 1, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” September 2005.

3. USNRC Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” March 2001.

4. GP-18199, “Transmittal of Reactor Pressure Vessel Time Limited Aging Analyses (TLAA) Report,” June 18, 2007.

5. USNRC Regulatory Guide 1.99, Revision 2, “”Radiation Embrittlement of Reactor Materials,” May 1988.

6. Alvin W. Vogtle Nuclear Plant Final Safety Analysis Report, Revision 14 - 2/28/07 Update.

7. USNRC Inspection and Enforcement Bulletin 88-08, “Thermal Stresses in Piping Connected to Reactor Cooling Systems,” June 1988.

8. USNRC Inspection and Enforcement Bulletin 88-11, “Pressurizer Surge Line Thermal Stratification,” December 1988.

9. NUREG/CR-6260, “Application of NUREG/CR-5999 Interim Fatigue Curves to Selected Nuclear Power Plant Components,” March 1995.

10. NUREG/CR-5704, “Effects of LWR Coolant Environments of Fatigue Design Curves of Austenitic Stainless Steels.”

11. NUREG/CR-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels.”

12. FP-VOG-315, Revision 0, “Baseline Evaluation and 60-Year Projection of Vogtle-1/2 Plant Cycles, Fatigue Usage, and Environmental Fatigue Usage,” Structural Integrity Associates, December 2005, (Westinghouse Proprietary).

13. VOG-01Q-301, Revision 0, “Environmentally Assisted Fatigue (EAF) Analysis for Vogtle Nuclear Plant Units 1 and 2,” Structural Integrity Associates, December 2005, (Westinghouse Proprietary).

14. AX5AB05A-00006, “Justification for not counting certain FSAR transients as part of TFMS (Purchase Order 7016986),” March 31, 1995.

15. WCAP-14422, Revision 2a, "Licensing Renewal Evaluation: Aging Management for Reactor Coolant System Supports, Westinghouse General Technical Report," December 2000.

16. WCAP-10551, "Technical Bases for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Alvin W. Vogtle Units 1 and 2," May 1984 (Westinghouse Proprietary).

17. 2X6AA10-10022, "WCAP-11531 Technical Bases for Eliminating Pressurizer Surge Line Rupture as the Structural Design basis for Vogtle Unit 2" July 1987, (Westinghouse Proprietary, WCAP-11532 (2XAA10-10023) is the non-Proprietary Version of this report).

18. WCAP-11531 Addendum 1, "Additional Information in Support of the Elimination of Postulated Pipe Ruptures in the Pressurizer Surge Line of Vogtle Unit 2," August 1987.

19. WCAP-11531 Addendum 2, "Additional Information in Support of the Elimination of Postulated Pipe Ruptures in the Pressurizer Surge Line of Vogtle Unit 2," September 1987.

20. 1X6AA10-10168, "WCAP-11583 Technical Bases for Eliminating Accumulator Line Rupture as the Structural Design Basis for Vogtle Unit 2," October 1987 (WCAP-11584 (1X6AA10-10167) is the non-Proprietary Version of this report).

21. 2X6AA10-10171, "WCAP-11599 Technical Bases for Eliminating RHR Line Rupture from the Structural Design Basis for Vogtle Unit 2," October 1987 (WCAP-11600 is the non-Proprietary version of this report).

22. 1X6AA10-10060, 2X6AA10-10060, "WCAP-12218 Supplement 2 A Supplementary Assessment of Leak-Before-Break for the Pressurizer Surge Lines of Vogtle Units 1 and 2," March 1990.

23. WCAP-10551-P, Addendum 1 Revision 0, "Technical Bases for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Alvin W. Vogtle Units 1 and 2 for the License Renewal Program," December 2005 (Westinghouse Proprietary).

24. WCAP-11583-P, Addendum 1 Revision 0, "Technical Bases for Eliminating Accumulator Line Rupture as the Structural Design Basis for the Alvin W. Vogtle Units 1 and 2 for the License Renewal Program," July 2006 (Westinghouse Proprietary).

25. GP-17940, "Vogtle Electric Generating Plant Units 1 and 2 - Use of Local Fatigue Monitoring in Lieu of Cycle Counting," Westinghouse Letter to SNC, May 25, 2006.

26. WCAP-16613-P, Rev. 1, "Vogtle Electric Generating Plant Measurement Uncertainty Recapture Power Uprate Program Engineering Report," February 2007 (Westinghouse Proprietary).

27. EPRI 1011955, “Materials Reliability Program: Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines (MRP-146),” June 2005 (EPRI Proprietary).

28. X4AQ10, Rev. 7, “Specification for Pipe Penetrations for the Georgia Power Company Alvin W. Vogtle Nuclear Plant Burke County, Georgia,” November 12, 1987.

29. AX4AQ10-134-2, Rev. A, ”Design Report for Pipe Penetrations for the Georgia Power Company Alvin W. Vogtle Nuclear Plant,” February 3, 1988.

30. AX4AQ10-129-1, ”Volume III-D Design Report for Pipe Penetrations for the Georgia Power Company Alvin W. Vogtle Nuclear Plant (Thermal & Fatigue Analysis Computer Data),” September 26, 1986.

31. WCAP-14535A, “Topical Report on Reactor Coolant Pump Flywheel Inspection Elimination,” November 1996.

32. Technical Specifications Vogtle Electric Generating Plant Unit Nos. 1 and 2 Docket Nos. 50-424 and 50-425 Appendix A to License Nos. NPF-68 and NPF-81, December 12, 2006.

33. 1X6AA10-00155, “WCAP-11277 ASME Section III Class 1 Structural Analysis of the Reactor Coolant Loop Piping for the Alvin W. Vogtle Unit 1 Nuclear Plant”.

34. 2X6AA10-00194, “WCAP-12000, ASME Section III Class I Structural Analysis of the Reactor Coolant Loop Piping”.

35. NL-07-0837, “Vogtle Electric Generating Plant Unit 2 Pressurizer Nozzle Full Structural Weld Overlay Evaluation,” SNC Letter to NRC, April 13, 2007.

36. NL-07-0803, “Vogtle Electric Generating Plant Unit 2 Pressurizer Nozzle Full Structural Weld Overlay Nondestructive Examination Results Spring 2007 Outage (2R12),” SNC Letter to NRC, April 13, 2007.

37. ASME Boiler and Pressure Vessel Code, Section XI Subsection IWL.

38. Calculation X2CJ02.06.10, “Trending of Tendon Prestress Loss – Unit 1 & 2”, approved June 16, 2006.

39. AX6AA10-30029, “WCAP-13117 Vogtle Electric Generating Plant Units 1 and 2 Nuclear Steam Supply System Rerating Engineering Report,” October 1993 (Westinghouse Proprietary).

40. WCAP-16688-P, “Vogtle Units 1 and 2 Pressurizer Safety/Relief, Spray, and Surge Nozzles Full Structural Weld Overlay Qualification,” Revision 0, January 2007.

APPENDIX A FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

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A.1.0 INTRODUCTION

This appendix provides the Updated Final Safety Analysis Report (UFSAR) supplement required by 10 CFR 54.21(d) for the VEGP License Renewal Application (LRA). The information presented here will be incorporated into the VEGP Updated Final Safety Analysis Report (UFSAR) following issuance of the renewed operating license. In accordance with Rule requirements, the supplement contains a summary description of the programs and activities for managing the effects of aging and a description of the evaluation of time-limited aging analyses (TLAAs) for the period of extended operation.

Appendix B provides a complete description of the aging management programs. For the purposes of the application, the programs are presented here in a manner that correlates to Appendix B. The numbering for the final version of the UFSAR Chapter may result in the order being changed.

A.2.0 AGING MANAGEMENT PROGRAMS

The VEGP integrated plant assessment for license renewal identified the aging management programs credited to provide reasonable assurance that structures and components requiring an aging management review will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation. This section describes the aging management programs and activities required to manage the effects of aging during the period of extended operation.

The aging management programs and activities in this section rely on the operations quality assurance program (OQAP) for VEGP and SNC for the elements of corrective action, confirmation process, and administrative controls. The VEGP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR 50, Appendix B. Corrective actions and administrative (document) control for both safety-related and nonsafety-related structures and components are accomplished per the existing corrective action program and document control program and are applicable to all aging management programs and activities that will be required during the period of extended operation. The confirmation process is part of the corrective action program and includes reviews to assure that corrective actions are adequate, tracking and reporting of corrective actions, and reviews of corrective action effectiveness. Any follow-up inspection required by the confirmation process is documented in accordance with the corrective action program. The corrective action, confirmation process, and administrative controls of the OQAP are applicable to all aging management programs and activities required during the period of extended operation.

A.2.1 ACCW SYSTEM CARBON STEEL COMPONENTS PROGRAM

The ACCW System Carbon Steel Components Program is a plant specific program that manages cracking of carbon steel components exposed to auxiliary component cooling water (ACCW) through a combination of leakage monitoring and routine and periodic inspections. This includes the VEGP Unit 1 and Unit 2 ACCW Systems, as well as carbon steel components serviced by these ACCW systems. The program is in response to operating experience related to nitrite induced stress corrosion cracking (SCC) and subsequent component leakage in ACCW System components.

The program relies upon leakage detection monitoring, routine walkdowns, and periodic visual examinations. The program also includes preventive measures applicable to repairs and modifications intended to minimize crack initiation sites, lower stresses, and improve inspectability.

The ACCW System Carbon Steel Components Program will be implemented prior to the period of extended operation.

A.2.2 BOLTING INTEGRITY PROGRAM

The Bolting Integrity Program is a plant specific program that manages cracking, loss of material, and loss of preload in mechanical bolted closures. The Bolting Integrity Program applies to safety-related and nonsafety-related bolting for pressure-retaining components within the scope of license renewal, with the exception of the reactor vessel head studs which are addressed by the Reactor Vessel Head Closure Stud Program.

Preventive aspects of the program include use of appropriate bolting and torquing practices, including control of thread lubricants. Periodic replacement of steam generator manway and handhole bolting is also included in the scope of the program as a preventive measure for managing cumulative fatigue damage for these fasteners. The program’s bolting and torquing practices are based on industry guidelines, vendor recommendations, and VEGP operating experience, as appropriate for VEGP applications. Consistent with NUREG-1339 recommendations, the use of lubricants containing molybdenum disulfide, which has been specifically implicated in stress corrosion cracking of bolting, is prohibited by the program.

The program also includes periodic inspection of closure bolting assemblies to detect signs of leakage that may be indicative of loss of preload, loss of material, or cracking. Periodic inspection of bolted closures in conjunction with the Inservice Inspection Program and External Surfaces Monitoring Program will detect the effects of aging and joint leakage. Operator rounds and system walkdowns also identify joint leakage.

The Bolting Integrity Program will be implemented prior to the period of extended operation.

A.2.3 BORIC ACID CORROSION CONTROL PROGRAM

The Boric Acid Corrosion Control Program monitors the condition of components on which borated water may leak to ensure that borated water leakage and associated boric acid residue is identified, evaluated and removed before any loss of intended function of affected components. The program detects boric acid leakage by periodic visual inspection of systems containing borated water for evidence of leakage and by inspection of adjacent structures and components for evidence of leakage. The program was developed in response to the recommendations of Generic Letter 88-05 and addresses operating experience contained in recent NRC generic communications.

Prior to the period of extended operation, VEGP will enhance the Boric Acid Corrosion Control Program to address the effects of borated water leakage on materials other than steels, including electrical components (e.g., electrical connectors), that are susceptible to boric acid corrosion.

A.2.4 BURIED PIPING AND TANKS INSPECTION PROGRAM

The Buried Piping and Tanks Inspection Program manages loss of material from the external surfaces of buried carbon steel, cast iron, and stainless steel components. The program includes both preventive measures and visual inspections. Preventive measures consist of coatings and wrappings which are required by design in accordance with industry standards. Buried components in the scope of license renewal will be inspected when they are excavated for maintenance or when exposed for any other reason.

Prior to entering the period of extended operation, a review will be performed to determine if at least one opportunistic or focused inspection of buried piping and tanks has been performed within the 10-year period prior to the period of extended operation. If an inspection did not occur, a focused inspection will be performed prior to the period of extended operation.

In addition, a focused inspection of buried piping and tanks will be performed within ten years after entering the period of extended operation, unless an engineering evaluation concludes that sufficient opportunistic and focused inspections have occurred during this time to demonstrate the ability of the underground coatings to protect the underground piping and tanks from degradation.

The Buried Piping and Tanks Inspection Program will be implemented prior to the period of extended operation.

A.2.5 CASS RCS FITTING EVALUATION PROGRAM

The CASS RCS Fitting Evaluation Program manages the effects of loss of fracture toughness due to thermal aging for susceptible cast austenitic stainless steel (CASS) components in the reactor coolant system (RCS). This program augments VEGP Inservice Inspection Program requirements.

This aging management program evaluates the susceptibility of CASS components to thermal aging embrittlement based on casting method, molybdenum content, and percent ferrite. Screening for susceptibility to thermal aging is not required for pump casings and valve bodies, based on the assessment documented in the letter dated May 19, 2000, from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Douglas Walters, Nuclear Energy Institute (NEI), ADAMS Accession No. ML003717179. The existing ASME Section XI inspection requirements, including the alternative requirements of ASME Code Case N-481 for pump casings, are adequate for all pump casings and valve bodies.

The program provides aging management through either a flaw tolerance evaluation or enhanced volumetric examination. Additional inspection or evaluations to demonstrate that the material has adequate fracture toughness are not required for components that are not susceptible to thermal aging embrittlement.

Based on screening consistent with the process specified in NUREG-1801, Rev. 1, Section XI.M12, the VEGP components that require additional aging management under this program are the VEGP Unit 1 Loop 4 RCP inlet elbow and the VEGP Unit 2 Loop 1 RCP inlet elbow. For these two castings, loss of fracture toughness due to thermal aging will be managed by component-specific flaw tolerance evaluation, additional inspections, or a combination of these techniques.

The CASS RCS Fitting Evaluation Program will be implemented prior to the period of extended operation.

A.2.6 CLOSED COOLING WATER PROGRAM

The Closed Cooling Water Program manages loss of material, cracking, and reduction of heat transfer in closed-cycle cooling water systems and the components cooled by these systems. The program is based on the EPRI closed cooling water chemistry guidelines.

The program includes maintenance of corrosion inhibitor, pH buffering agent, and biocide concentrations. Concentrations of detrimental ionic species are monitored and reduced if necessary. Important diagnostic parameters are monitored and evaluated for significant trends. The program also uses corrosion-monitoring activities including trending of iron and copper concentrations and component inspections. Corrosion rate monitoring methods may also be used.

Prior to the period of extended operation, VEGP will enhance the Closed Cooling Water Program to indicate the components in each system that are most susceptible to various corrosion mechanisms and to ensure that corrosion monitoring is appropriately accomplished.

A.2.7 DIESEL FUEL OIL PROGRAM

The Diesel Fuel Oil Program is a plant specific program that manages loss of material in the diesel fuel oil systems for the emergency diesel generators and the diesel engine-driven fire water pumps through monitoring and maintenance of diesel fuel oil quality. The program is based on VEGP Technical Specifications requirements and supplemental requirements.

Draining, cleaning, and internal condition inspections of diesel fuel oil components are implemented under other VEGP aging management programs as noted below.

- Periodic cleaning and inspection the interior of the EDG System's diesel fuel oil storage tanks is performed under the Periodic Surveillance and Preventive Maintenance Program.
- Visual inspection of the diesel engine-driven fire water pumps fuel supply lines for leakage during diesel operation is performed under the Fire Protection Program.
- The One-Time Inspection Program describes inspections to verify the effectiveness of the Diesel Fuel Oil Program. The inspections include thickness measurements of storage tank bottom surfaces to verify that significant degradation of the tank base material is not occurring.

A.2.8 EXTERNAL SURFACES MONITORING PROGRAM

The External Surfaces Monitoring Program inspects external surfaces of mechanical system components requiring aging management for license renewal in external air environments. Surfaces constructed from materials susceptible to aging in these environments are inspected at frequencies that assure the effects of aging are managed such that system components will perform their intended function during the period of extended operation.

The program detects corrosion, flange leakage, missing or damaged insulation, damaged coatings, and indications of fretting or wear. Inspections of insulated surfaces are performed on a sampling basis, targeting areas identified by baseline inspections and operating experience as most susceptible. Accessible polymers and elastomers are also inspected.

Systems and components which are normally inaccessible and therefore not readily available for inspection are inspected when they are made accessible during outages, routine maintenance or repair, or they may be inspected by remote means.

The External Surfaces Monitoring Program will be implemented prior to the period of extended operation.

A.2.9 FIRE PROTECTION PROGRAM

The Fire Protection Program includes inspections, performance testing, and condition monitoring of water and gas based fire protection systems, fire barriers, and fire pump diesels and their fuel oil supply components. The program manages fire protection components relied upon for 10 CFR 50.48 compliance such that the intended functions will be maintained through the period of extended operation.

The water-based and gas-based fire suppression systems are tested and inspected in accordance with plant procedures based, in part, on the applicable National Fire Protection Association codes and standards. Periodic inspections, performance testing and system monitoring provide an effective means to assure functionality of these components.

Diesel driven fire pumps and fuel oil supply components are periodically inspected and tested to ensure that the diesels, pumps and fuel oil supply components can perform their intended functions.

The fire barrier inspections include periodic visual inspection of structural fire barriers, including fire walls, floors, ceilings, fire penetration seals and fire doors.

VEGP will implement the following enhancements to the Fire Protection Program:

- Wall thickness evaluations will be performed on water suppression piping systems using non-intrusive volumetric testing or visual inspections to ensure that wall thicknesses are within acceptable limits. Initial wall thickness evaluations will be performed before the end of the current operating term. Subsequent evaluations will be performed at plant specific intervals during the period of extended operation. The plant specific inspection intervals will be determined based on previous evaluations and site operating experience.

- A sample of sprinkler heads will be inspected using the guidance of NFPA 25 "Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (1998 Edition), Section 2-3.1.1, or NFPA 25 (2002 Edition), Section 5.3.1.1.1. Where sprinkler heads have been in service for 50 years, they will be replaced or representative samples from one or more sample areas will be submitted to a recognized testing laboratory for field service testing. This sampling will be performed every 10 years after the initial field service testing. The 50 years of time in service begins when the system was placed in service, not when the plant became operational.

- Prior to the period of extended operation, Fire Protection Program procedures will be revised to provide more detailed instructions for visual inspection of Fire Pump Diesel fuel supply lines for leakage, corrosion, and general degradation while the engine is running during fire suppression system pump tests.

A.2.10 FLOW-ACCELERATED CORROSION PROGRAM

The Flow-Accelerated Corrosion (FAC) Program manages loss of material (wall thinning) due to FAC in susceptible plant piping and other components. The Flow-Accelerated Corrosion Program is based on the guidance of NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program," including subsequent revisions. The program includes analysis to determine susceptible locations, predictive modeling techniques, baseline inspections of wall thickness, follow-up inspections, and repair or replacement of degraded components as necessary.

VEGP also uses the FAC Program and its inspection techniques to manage wall thinning that is occurring in piping components downstream of the steam generator blowdown demineralizers. The wall thinning has been attributed to the acidic conditions of the demineralizer effluent, not FAC.

A.2.11 FLUX DETECTOR THIMBLE INSPECTION PROGRAM

The Flux Thimble Tube Inspection Program manages loss of material due to fretting/wear of the incore flux detector thimble tubes. The program implements the VEGP response to NRC Bulletin No. 88-09, "Thimble Tube Thinning in Westinghouse Reactors." The program uses proven non-destructive examination techniques to monitor for wear of the flux thimble tubes.

Wear rate predictions determine the need for corrective actions such as repositioning, capping, or replacement of a flux thimble tube. The wear rate predictions are also used to establish the interval to the next inspection.

Prior to the period of extended operation, A VEGP program procedure will be issued documenting the Flux Thimble Tube Inspection Program administration and implementing activities credited for license renewal.

A.2.12 GENERIC LETTER 89-13 PROGRAM

The Generic Letter 89-13 Program includes the activities which implement the VEGP response to the NRC recommended actions contained in Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The Generic Letter 89-13 Program activities include mitigation, as well as performance and condition monitoring techniques, to ensure that the effects of aging on the Nuclear Service Cooling Water (NSCW) System, and on those components supplied by the NSCW System will be managed.

Prevention or mitigation of fouling and loss of material in the NSCW System and NSCW supplied components is accomplished, in part, by intermittent injection of appropriate water treatment chemicals. Other preventive and monitoring aspects of the VEGP Generic Letter 89-13 Program include periodic flushing of lines to mitigate or prevent fouling, periodic measurement of flow rates through selected components, periodic analysis of corrosion coupons, and cleaning of selected heat exchangers at regular intervals. Some components are visually inspected for fouling or loss of material. Volumetric examination may be used to detect degradation.

Prior to the period of extended operation, VEGP will implement the following enhancements to the Generic Letter 89-13 Program:

- An overall program procedure will be prepared which describes the various program activities that comprise the Generic Letter 89-13 Program and their implementing controls such as chemistry procedures, maintenance activities, scheduled surveillances, or other mechanisms.
- The VEGP Generic Letter 89-13 Program activities will include inspection of the NSCW Transfer Pumps' casings and bolting and NSCW Cooling Tower spray nozzles.

A.2.13 INSERVICE INSPECTION PROGRAM

The VEGP Inservice Inspection Program is a plant specific program that mandates examinations, testing and inspections of components and systems to detect deterioration and manage aging effects. The program uses periodic visual, surface, and volumetric examination and leakage tests of Class 1, 2 and 3 pressure-retaining components, their integral attachments, and supports to detect and characterize flaws.

The program is implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI for Class 1, 2, and 3 pressure-retaining components, their integral attachments, and supports. Inspection, repair, and replacement of these components are covered in Subsections IWB, IWC, IWD and IWF, respectively.

In conformance with 10 CFR 50.55a(g)(4)(ii), and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP Inservice Inspection Program is updated at the end of each inspection interval to the latest Edition and Addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval.

A.2.14 NICKEL ALLOY MANAGEMENT PROGRAM FOR NON-REACTOR VESSEL CLOSURE HEAD PENETRATION LOCATIONS

The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations is a plant specific program that manages cracking due to primary water stress corrosion cracking (PWSCC) for non-reactor vessel head nickel alloy component locations. The overall goal of the program is to maintain plant safety and minimize the impact of PWSCC on plant availability through assessment, inspection, mitigation, and repair or replacement of susceptible components. Program development is based on MRP-126, “Generic Guidance for Alloy 600 Management.”

The program is based on the following set of implementation commitments:

(1) SNC will continue to participate in industry initiatives directed at resolving PWSCC issues, such as owners group programs and the EPRI Materials Reliability Program.

(2) SNC will comply with applicable NRC Orders.

(3) SNC will submit a program inspection plan for VEGP that includes implementation of applicable NRC Bulletins, Generic Letters, and staff accepted industry guidance. The inspection plan will be submitted to the staff for review and approval not less than 24 months prior to entering the period of extended operation for VEGP Units 1 and 2.

Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations will be fully implemented prior to the period of extended operation.

A.2.15 NICKEL ALLOY MANAGEMENT PROGRAM FOR REACTOR VESSEL CLOSURE HEAD PENETRATIONS

The Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations addresses industry concerns regarding the potential for primary water stress corrosion cracking (PWSCC) in nickel alloy components exposed to the reactor coolant environment. The program is based upon the requirements of NRC First Revised Order EA-03-009, which establishes requirements for susceptibility ranking and inspections. Susceptibility ranking is based on calculated effective degradation years and the results of previous inspection findings. Inspection frequencies are determined by the susceptibility category. Inspections to detect cracking include bare metal visual examinations and non-visual techniques.

The program implements commitments for reactor vessel closure head penetrations associated with nickel alloys from NRC Orders, Bulletins, and Generic Letters, and Staff accepted industry guidelines.

A.2.16 OIL ANALYSIS PROGRAM

The VEGP Oil Analysis Program ensures that the lubricating oil and hydraulic fluid environments of in-scope mechanical systems are maintained to the required quality. The Oil Analysis Program maintains lubricating oil and hydraulic fluid system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to deleterious aging effects. Program activities include sampling and analysis of lubricating oil and hydraulic fluid for detrimental contaminants.

The One-Time Inspection Program includes inspections planned to verify the effectiveness of the Oil Analysis Program.

Prior to the period of extended operation, VEGP will implement the following enhancements to the Oil Analysis Program:

- An overall program procedure or guideline will be prepared to formalize the sampling and analysis activities performed.
- Viscosity, neutralization number and flash point of lubricating oil samples will be required for components where the oil is changed based on its analyzed condition (instead of being changed on a regular schedule regardless of condition).
- When a lubricating oil sample's particle count exceeds established limits or action levels, analytical ferrography or elemental analysis will be used to identify wear particles or corrosion products for the lubricating oil system components in the scope of license renewal.

A.2.17 ONE-TIME INSPECTION PROGRAM

The VEGP One-Time Inspection Program provides objective evidence that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the period of extended operation, and therefore will not require additional aging management.

The program uses one-time inspections of plant piping and components to verify the effectiveness of aging management programs or to confirm the insignificance of potential aging effects where:

a) an aging effect is not expected to occur but there is insufficient data to rule it out with reasonable confidence,

b) an aging effect is expected to progress very slowly in a specified environment, but localized conditions may be more adverse than specified, or

c) the characteristics of the aging effect include a long incubation period relative to the operating life of the plant.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

A.2.18 ONE-TIME INSPECTION PROGRAM FOR ASME CLASS 1 SMALL BORE PIPING

The VEGP One-Time Inspection Program for ASME Class 1 Small Bore Piping addresses NRC concerns on the potential for cracking of Class 1 piping with a diameter less than NPS 4.

To address stress corrosion cracking concerns, volumetric examination of a sample population of ASME Class 1 Piping butt welds less than NPS 4 will be performed. Examination locations will be selected using a risk-based approach that will consider susceptibility, inspectability, dose, and operating experience.

To address unanticipated thermal fatigue cracking of ASME Class 1 piping less than NPS 4, VEGP will screen and evaluate pipe lines using MRP-146, “Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines,” or later updated guidance. Small bore piping inspections to detect thermal fatigue will be performed only at piping locations that fail screening and are not monitored for thermal cycling.

Examinations performed by the program may be incorporated into an NRC approved Risk Informed Inservice Inspection Program. The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

A.2.19 ONE-TIME INSPECTION PROGRAM FOR SELECTIVE LEACHING

The VEGP One-Time Inspection Program for Selective Leaching addresses selective leaching in susceptible cast iron and copper alloy components. The program includes a one-time examination of a sample population of components most likely to exhibit selective leaching. Initial examinations will be completed prior to entering the period of extended operation. If degradation due to selective leaching is identified, additional examinations will be performed.

Examination techniques may include hardness measurement (where feasible based on form and configuration), visual examination, metallurgical evaluation, or other proven techniques determined to be effective in identifying and assessing the extent of selective leaching.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

A.2.20 OVERHEAD AND REFUELING CRANE INSPECTION PROGRAM

The VEGP Overhead and Refueling Crane Inspection Program manages the effects of general corrosion and wear of the crane bridge and trolley structural girders and beams and the crane rails and support girders in the scope of license renewal.

The Overhead and Refueling Crane Inspection Program is a condition monitoring program that includes the following nuclear safety-related and quality related material handling systems: Refueling Machine, Fuel Handling Machine Bridge Crane, Spent Fuel Cask Bridge Crane, and the Containment Building (Reactor) Polar Crane.

A.2.21 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE ACTIVITIES

The Periodic Surveillance and Preventive Maintenance Activities is a plant specific program that includes existing and new periodic inspections and tests that are relied on by license renewal to manage the aging effects applicable to the components included in the program. The Periodic Surveillance and Preventive Maintenance Activities are generally implemented through repetitive tasks and surveillances.

Inspection and testing intervals are dependent on the component, material, and environment, and take into consideration industry and plant-specific operating experience and manufacturer's recommendations.

The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions. Established techniques such as visual inspections are used. The following existing surveillance and maintenance activities are credited for license renewal:

- Control Building Control Room Filter Unit Seal inspections
- Emergency Diesel Generator (EDG) Diesel Fuel Oil Storage Tank cleaning and inspections
- Steam Generator Blowdown Trim Heat Exchanger inspections
- NSCW Cooling Tower Fill and Drift Eliminator testing
- Diaphragm inspections for the Boric Acid Storage Tank, Condensate Storage Tank, and Reactor Make-up Water Storage Tank

Prior to the period of extended operation, VEGP will enhance the Periodic Surveillance and Preventive Maintenance Activities to include the following additional surveillance and maintenance activities:

- Steam Generator Blowdown Secondary Sample Bath Shell inspections
- Steam Generator Blowdown Corrosion Product Monitor cooler shell inspections
- Potable Water System water heater housing inspections
  (for the in-scope water heaters)

A.2.22 PIPING AND DUCT INTERNAL INSPECTION PROGRAM

The VEGP Piping and Duct Inspection Program manages corrosion of steel, stainless steel, and copper alloy components and degradation of elastomer components due to changes in material properties. Inspections are normally performed concurrent with scheduled preventive maintenance, surveillance testing, and corrective maintenance activities. Specific examinations not coordinated with existing work activities may also be performed at the discretion of the program owner. Inspection locations and intervals are dependent on assessments of the likelihood of significant degradation and on current industry and plant-specific operating experience.

Examination techniques will be appropriate to detect and assess the aging mechanism of concern and may include visual examination, non-visual NDE such as ultrasonic testing or radiography, physical manipulation of elastomers, etc.

The Piping and Duct Internal Inspection Program will be implemented prior to the period of extended operation.

A.2.23 REACTOR VESSEL CLOSURE HEAD STUD PROGRAM

The VEGP Reactor Vessel Closure Head Stud Program manages loss of material and cracking in the reactor vessel closure head studs, nuts and washers. Program aspects include preventive measures as described in Regulatory Guide 1.65 and condition monitoring.

Preventive measures include material controls and the use of approved lubricants. The VEGP reactor vessel head studs are fabricated from modified SA-540 Grade B24 material as specified in ASME Boiler and Pressure Vessel Code Case 1605. This Code Case is not specified in Regulatory Guide 1.65 but has been approved by the NRC via Regulatory Guide 1.85. VEGP actual stud material properties have ultimate tensile strengths less than 170 ksi. Reactor vessel closure head studs and nuts are lubricated with an approved, stable lubricant at each reassembly.

Condition monitoring includes examination and leakage detection consistent with the VEGP Inservice Inspection Program.

A.2.24 REACTOR VESSEL INTERNALS PROGRAM

The Reactor Vessel Internals Program is a plant specific program that addresses material degradation issues for the VEGP reactor vessel internals.

The program will be based on the following set of implementation commitments:

a) SNC will participate in the industry program for investigating and managing aging effects on reactor vessel internals.

b) SNC will evaluate and implement the results of the industry programs, such as the EPRI Material Reliability Program (MRP), as applicable to the VEGP reactor vessel internals.

c) SNC will submit an inspection plan for the VEGP reactor vessel internals to the NRC for review and approval not less than 24 months before entering the period of extended operation for VEGP Units 1 and 2.

The Reactor Vessel Internals Program will be implemented prior to the period of extended operation.

A.2.25 REACTOR VESSEL SURVEILLANCE PROGRAM

The Reactor Vessel Surveillance Program manages loss of fracture toughness due to neutron embrittlement in reactor vessel alloy steel materials exposed to neutron fluence exceeding 1 x 10^{17} n/cm^2 (E > 1.0 MeV). The program is based on 10 CFR 50, Appendix H, “Reactor Vessel Material Surveillance Requirements“ and ASTM E 185-82, “Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels.”

Capsules are periodically removed during the course of plant operating life. Neutron embrittlement is evaluated through surveillance capsule testing and evaluation, fluence calculations and benchmarking, and monitoring of effective full power years (EFPYs).

For both the VEGP Unit 1 and 2 reactor vessels, capsules with accumulated neutron fluence equivalent to 60 years of operation have already been pulled and tested. The remaining capsules (2 capsules in each unit) will be removed such that, at the time of removal, each of the remaining capsules will have accumulated neutron fluence that is not less than once, nor greater than twice, the peak end of life fluence expected for an additional 20-year license renewal term (80 years of operation).

The Reactor Vessel Surveillance Program will be enhanced as follows:

(1) Prior to removal of the last surveillance capsule in each unit, program documents will be revised to require that tested and untested specimens from all capsules removed from the VEGP reactor vessels remain in storage.

(2) Alternate dosimetry will be installed to monitor neutron fluence on the reactor vessel after removal of the last surveillance capsule in that unit. This enhancement will be implemented prior to removal of the last surveillance capsule in each unit.

A.2.26 STEAM GENERATOR TUBING INTEGRITY PROGRAM

The Steam Generator Tubing Integrity Program is a subprogram of the VEGP Steam Generator Program, which is an integrated program for managing the condition of the VEGP Steam Generators. The Program focuses on steam generator tube integrity, tube plugging, and the management and repair of steam generator tubing. The Steam Generator Program is in compliance with the program described in NEI 97-06, Steam Generator Program Guidelines, and VEGP Technical Specifications, Section 5.5.9. Program deviations from NEI 97-06 are prepared and approved in accordance with NEI 97-06 and EPRI steam generator management program guidance.

The program includes a balance of prevention, inspection, evaluation and repair, and leakage monitoring. Major program elements include degradation assessments, inspection, integrity assessments, leakage monitoring, and chemistry controls.

A.2.27 STEAM GENERATOR PROGRAM FOR UPPER INTERNALS

The Steam Generator Program for Upper Internals is a plant-specific subprogram of the VEGP Steam Generator Program, which is an integrated program for managing the condition of the steam generators at VEGP. The Steam Generator Program is in compliance with the program described in NEI 97-06, Steam Generator Program Guidelines.

The Steam Generator Program for Upper Internals includes VEGP Steam Generator Program activities associated with aging management of the steam generator upper internals components determined to be within the scope of license renewal. The program implements inspection activities intended to detect degradation of secondary side internals needed to maintain tubing integrity and accomplish steam generator intended functions. An assessment based upon steam generator design, potential degradation mechanisms, and related VEGP and industry operating experience is performed to establish inspection requirements for secondary side internals components. The resulting inspection requirements are incorporated into the steam generator inspection plans.

A.2.28 WATER CHEMISTRY CONTROL PROGRAM

The VEGP Water Chemistry Control Program mitigates loss of material, cracking, and reduction of heat transfer in system components and structures through the control of water chemistry. The program includes control of detrimental chemical species and the addition of chemical agents.

The VEGP Water Chemistry Control Program is based on the EPRI water chemistry guidelines for primary and secondary water chemistry control.

The One-Time Inspection Program includes inspections to verify the effectiveness of the Water Chemistry Control Program.

A.2.29 10 CFR 50 APPENDIX J PROGRAM

The 10 CFR 50 Appendix J Program monitors leakage rates through the containment pressure boundary, including penetrations and access openings. Containment leak rate tests assure that leakage through the primary containment, and systems and components penetrating primary containment, does not exceed the allowable leakage limits specified within the VEGP Technical Specifications. Corrective actions are taken if leakage rates exceed established administrative limits for individual penetrations or the overall containment pressure boundary.

A.2.30 INSERVICE INSPECTION PROGRAM – IWE

The VEGP Inservice Inspection Program – IWE is a plant-specific program implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI, Subsection IWE. The program manages aging effects for the containment liners and its integral attachments including connecting penetrations and parts forming the leak tight boundary. The primary inspection method for the program is periodic visual examination along with limited volumetric examinations utilizing ultrasonic thickness measurements as needed.

In conformance with 10 CFR 50.55a(g)(4)(ii) and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP Inservice Inspection Program – IWE is updated at the end of each 120 month inspection interval to the latest Edition and Addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval.

A.2.31 INSERVICE INSPECTION PROGRAM – IWL

The VEGP Inservice Inspection Program - IWL is a plant-specific program implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI Subsection IWL for Class CC components. The program manages the reinforced concrete and unbonded post-tensioning systems of the Containment structures.

In conformance with 10 CFR 50.55a(g)(4)(ii), and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP Inservice Inspection Program - IWL is updated at the end of each 120 month inspection interval to the latest Edition and Addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval.

A.2.32 STRUCTURAL MONITORING PROGRAM

The VEGP Structural Monitoring Program is based on the requirements and guidance set forth in 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants” and Regulatory Guide 1.160, Rev. 2, “Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.” VEGP uses the Structural Monitoring Program to monitor the condition of structures and structural components within the scope of the Maintenance Rule, thereby providing reasonable assurance that that there is no loss of structure or structural component intended function.

Prior to the period of extended operation, VEGP will implement the following enhancements to the Structural Monitoring Program:

- The scope of the Structural Monitoring Program will be expanded to include the additional structures that require monitoring for license renewal.
- The scope of inspection for structures that require monitoring for license renewal will be clarified. An area-based inspection will be performed unless a detailed inspection scope is provided.
- The Structural Monitoring Program scope for hangers and supports will be clarified.
- Program requirements will be revised to include periodic ground water monitoring to confirm that groundwater chemistry remains non-aggressive as defined in NUREG 1801.
- Underwater inspection of the NSCW cooling tower basins, including appropriate inspection and acceptance criteria, will be added to the Structural Monitoring Program.

A.2.33 STRUCTURAL MONITORING PROGRAM – MASONRY WALLS

The Structural Monitoring Program - Masonry Walls is part of the VEGP Structural Monitoring Program that implements structures monitoring requirements as specified by 10 CFR 50.65. The Masonry Wall Program manages aging of masonry walls, and structural steel restraint systems of the masonry walls, within scope of license renewal. The program includes the concrete masonry units and restraint systems used to seal and provide radiation shielding of some access openings in the Seismic Category 1 structures.

The 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 establish examination criteria, evaluation requirements, and acceptance criteria.

The Structural Monitoring Program - Masonry Walls will be enhanced prior to the period of extended operation to include monitoring of masonry walls in the structures which are in scope for license renewal but are not currently monitored under the program.

A.2.34 NON-EQ CABLES AND CONNECTIONS PROGRAM

The Non-EQ Cables and Connections Program will be used to maintain the function of electrical cables and connections which are not subject to the environmental qualification requirements of 10 CFR 50.49, but are exposed to adverse localized environments caused by heat, radiation or moisture. An adverse localized environment is an environment that is significantly more severe than the service condition for the insulated cable or connection.

A representative sample of accessible insulated cables and connections within the scope of license renewal will be visually inspected for cable and connection jacket surface anomalies such as embrittlement, discoloration, and cracking. The technical basis for the sample selections of cables and connections to be inspected is provided. The scope of this sampling program includes electrical cables and connections in adverse localized environments.

The Non-EQ Cables and Connections Program will be implemented and the first inspection completed prior to the period of extended operation.

A.2.35 NON-EQ INACCESSIBLE MEDIUM-VOLTAGE CABLES PROGRAM

The Non-EQ Inaccessible Medium-Voltage Cables Program manages the aging effects for inaccessible medium-voltage cables (cables with operating voltage from 2kV to 35kV) in the scope of license renewal exposed to significant moisture and significant voltage. The aging effect of concern is "localized damage and breakdown of insulation." The program includes periodic inspection and removal of water accumulation in cable manholes, and periodic cable testing.

Manholes which retain water and contain medium-voltage cables in the scope of license renewal are periodically inspected for water collection and the accumulated water removed, as needed. The frequency of inspection is based on actual plant experience but at least once every two years.

In-scope medium-voltage cables exposed to significant moisture and voltage are tested at least once every ten years to provide an indication of the condition of the conductor insulation. The specific test performed is a proven test for detecting deterioration of the insulation system due to wetting.

The Non-EQ Inaccessible Medium-Voltage Cables Program will be implemented and the first inspections completed prior to the period of extended operation.

A.2.36 NON-EQ ELECTRICAL CABLE CONNECTIONS ONE-TIME INSPECTION PROGRAM

The Non-EQ Cable Connections One-Time Inspection Program is a plant specific program that performs one-time inspections on a sample of bolted connections in the scope of license renewal to confirm that loosening of electrical connections is not an aging effect requiring additional aging management during the period of extended operation. The program inspects for loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

The factors considered for sample selection are application (medium and low voltage, defined as <35kV), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.). The technical basis for the sample selections will be documented. Inspection methods may include thermography, contact resistance testing, or other appropriate methods including visual inspection based on plant configuration and industry guidance.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

A.2.37 ENVIRONMENTAL QUALIFICATION PROGRAM

The Environmental Qualification (EQ) Program implements the requirements of 10 CFR 50.49. The EQ Program has been established to demonstrate that certain electrical components located in harsh plant environments are qualified to perform their safety functions in those harsh environments, consistent with 10 CFR 50.49 requirements. The EQ Program manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations. The program requires action be taken before individual components in the scope of the program exceed their qualified life. Actions taken include replacement on a specified time interval of piece parts or complete components to maintain qualification, and reanalysis.

As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Some aging evaluations for EQ components specify a qualification of at least 40 years and are considered TLAAs for license renewal. The EQ Program ensures that these EQ components are maintained within the bounds of their qualification bases.

A.2.38 FATIGUE MONITORING PROGRAM

The VEGP Fatigue Monitoring Program consists of two existing programs, which are the Fatigue and Cycle Monitoring Program and Thermal Stratification Data Collection. The Fatigue and Cycle Monitoring Program, also known as the VEGP Component or Cyclic Transient Limit Program (CCTLP), is described in Section 5.5.5 of the VEGP Technical Specifications. This program provides controls to track the cyclic or transient occurrences to ensure that components are maintained within the design limit. The component cyclic or transient limits are provided in VEGP UFSAR Section 3.9.N.1. The Thermal Stratification Data Collection program monitors for adverse thermal stratification and cycling resulting from isolation valve leakage in the normally stagnant non-isolable RCS branch lines identified in the VEGP response to IEB 88-08. The VEGP Fatigue Monitoring Program uses a combination of cycle counting, cycle-based fatigue monitoring, and stress-based fatigue monitoring to monitor and track fatigue usage.

Prior to the period of extended operation, the Fatigue Monitoring Program will be enhanced as follows:

1. Implementing documents will be revised to address the effect of the full structural weld overlays applied to the pressurizer spray and surge nozzles on the stress-based module calculation of cumulative usage factor (CUF).
2. The VEGP UFSAR will be revised to require fatigue monitoring of the Accumulator/RHR nozzles and pressurizer heater penetrations.
3. Implementing documents will be revised to reduce acceptable CUF values to account for environmental fatigue effects for those NUREG-6260 locations monitored for fatigue.
4. Implementing documents will be revised to explicitly require that the corrective actions initiated for exceeding an acceptance criterion include a review to identify and assess any additional affected reactor coolant pressure boundary locations.

A.3.0 EVALUATION OF TIME LIMITED AGING ANALYSES (TLAA)

In accordance with 10 CFR 54.21(c), an application for a renewed operating license must include evaluation of time-limited aging analyses (TLAAs) for the period of extended operation. This section summarizes the TLAAs identified for VEGP license renewal.

A.3.1 REACTOR VESSEL NEUTRON EMBRITTLEMENT ANALYSES

Analyses associated with embrittlement of reactor vessel materials due to neutron irradiation are TLAAs. The End-Of-Life (EOL) bases for these analyses are selected to bound the projected effective full power years (EFPY) for an operating term of 60 years.

The following VEGP analyses are TLAAs that address the effects of neutron embrittlement on the VEGP reactor vessels.

- Neutron Fluence
- Upper-Shelf Energy (USE)
- Pressurized Thermal Shock (PTS)
- Adjusted Reference Temperature (ART)
- Pressure-Temperature (P-T) Limits

A.3.1.1 Neutron Fluence

The VEGP reactor vessel neutron fluence calculations were projected out to EOL for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). The reactor vessel neutron fluences, including extended beltline materials, were calculated using a method satisfying the requirements set forth in Regulatory Guide 1.90, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," Revision 0 (March 2001). These projections are used in the USE, PTS, ART, and P-T analyses described in the sections that follow.

A.3.1.2 Upper-Shelf Energy (USE)

Appendix G of 10 CFR Part 50 requires that the reactor vessel beltline materials maintain a Charpy impact test upper-shelf absorbed energy (USE) of no less than 50 ft-lbs throughout the life of the reactor vessel, unless an approved analysis supports a lower value.

The VEGP analyses have been projected to the end of the period of extended operation for the reactor vessel materials (base materials and welds) with projected fluence exceeding 1×10^{17} n/cm^2 (MeV > 1.0). All Unit 1 and Unit 2 base materials and welds have a USE value at EOL of greater than 50 ft-lbs, which meets the acceptance criteria of 10 CFR 50, Appendix G. Therefore, these TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.3.1.3 Pressurized Thermal Shock (PTS)

The requirements of 10 CFR 50.61 provide for protection against pressurized thermal shock (PTS) events in pressurized water reactors. The screening criterion in 10 CFR 50.61 is 270°F for plates, forgings, and axial welds and 300°F for circumferential welds. According to this regulation, if the calculated RT_{PTS} for the reactor beltline materials is less than the specified screening criterion, then the vessel is acceptable with regard to the risk of vessel failure during postulated pressurized thermal shock transients.

The RT_{PTS} calculations for VEGP Units 1 and 2 have been projected to the end of the period of extended operation for all reactor vessel materials (base materials and welds) with projected fluence exceeding 1×10^{17} n/cm^2 (MeV > 1.0). All Unit 1 and Unit 2 base materials and welds meet the screening criteria contained in 10 CFR 50.61 at EOL. Therefore, these TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.3.1.4 Adjusted Reference Temperature (ART)

The ART values are an input to the pressure-temperature (P-T) limit curves discussed in the following section. The calculations determining the ART for the critical locations of the reactor vessel meet the definition of a TLAA pursuant to the criteria of 10 CFR 54.3. These ART calculations have been projected through the end of the period of extended operation and the results demonstrate the beltline materials remain limiting, and the projected ART values permit adequate operating margins to P-T limits through the period of extended operation. Therefore, these TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.3.1.5 Pressure Temperature (P-T) Limits

Appendix G of 10 CFR Part 50 requires heat-up and cool-down of the reactor pressure vessel be accomplished within established pressure and temperature limits. Plant specific calculations establish these limits. The calculations utilize materials and fluence data obtained through plant specific reactor surveillance capsule programs. The calculations for VEGP Units 1 and 2 meet the definition of a TLAA.

As described in the Pressure Temperature Limits Report (PTLR), the Reactor Vessel Surveillance Program updates the P-T limit curves considering the data gained from examination of surveillance specimens from capsules that SNC pulls. The content and update of the PTLR is in accordance with the requirements of Section 5.6.6 of the VEGP Technical Specifications. When the operating conditions of each unit merit the use of a different curve, the PTLR for that unit is updated to include P-T limit curves that bound the current level of neutron embrittlement (i.e., EFPY) for the unit. Therefore, this TLAA demonstration is made in accordance with 10 CFR 54.21(c)(1)(ii) and (iii).

The VEGP Pressure Temperature Limits Report (for each unit) will be updated to address neutron embrittlement for the 60-year operating life prior to the unit entering the period of extended operation.

A.3.2 METAL FATIGUE ANALYSIS

The thermal fatigue analyses of the VEGP mechanical components have been identified as TLAAs.

A.3.2.1 ASME Section III, Class 1 Component Fatigue Analysis

The VEGP design incorporates the requirements of Section III Class 1 of the ASME Code, which requires a discrete analysis of the thermal, mechanical and dynamic stress cycles on components that make up the reactor coolant pressure boundary. Although original design specifications commonly state that the transient conditions are for a 40-year design life, the fatigue analyses themselves are based on specified numbers of design transients, rather than on a specific operating life. Operating experience at VEGP and similar units has demonstrated that the analyzed numbers of design basis transients are, in general, conservative for a 40 year life. The Fatigue Monitoring Program monitors and tracks the cyclic and transient occurrences.

To address the additional operating term, the VEGP design transient cycle occurrences were projected through the period of extended operation. For the feedwater cycling, loss of charging flow, and loss of letdown and return to service transients, VEGP relies on cumulative usage factor (CUF) monitoring of the limiting component locations in lieu of cycle counting. Therefore, the CUFs were projected for these limiting locations in lieu of projecting their transient cycle occurrences. These limiting component locations are the steam generator main and auxiliary feedwater nozzles, and the normal and alternate charging nozzles. The results of the cycles and CUF projections show that the original transient cycles were conservative and that the design fatigue analyses for VEGP Class 1 components and piping remain valid, for 60 years.

In addition to the original design transients, fatigue loading transients and issues have been subsequently identified that are not part of the original fatigue analyses. For the lower pressurizer head and surge line, thermal stratification and insurge/outsurge transients are evaluated (IEB 88-11). Also, the impact of the reactor coolant system environment on the fatigue life of piping and components (GSI-190) requires specific evaluation for license renewal.

To address NRC IEB 88-11, the impact of thermal stratification on the fatigue usage in the surge line was evaluated for VEGP. The original evaluation showed that the surge line fatigue usage was acceptable for 40 years of operation, including the effects of thermal stratification due to insurge and outsurges from the pressurizer. For license renewal, stress-based fatigue monitoring is credited for managing the CUF of the surge line, including the effects of pressurizer insurge/outsurge and thermal stratification in both the lower pressurizer head and both surge line nozzles.

Generic Safety Issue (GSI) 190 addresses fatigue life of metal components and was closed by the NRC in December 1999. In the closure letter, however, the NRC concluded that licensees should address the effects of reactor coolant environment on the fatigue life of selected components as aging management programs are formulated in support of license renewal.

The effects of reactor coolant environment on component fatigue life for locations equivalent to those in Section 5.4 of NUREG/CR-6260 for the newer vintage Westinghouse plants have been evaluated for VEGP using the formulas from NUREG/CR-5704 for stainless steel components and from NUREG/CR-6583 for carbon and low-alloy steel components.

For the following locations, the application of the appropriate environmental factors to the design CUF values that were calculated based on the VEGP set of original design transients yielded acceptable results (e.g., CUF<1.0).

- Reactor Vessel Shell and Lower Head
- Reactor Vessel Inlet and Outlet Nozzles

For the following locations, the application of the appropriate environmental factors to the CUF values that were calculated based on the VEGP set of original design transients yielded unacceptable results without additional management. VEGP manages the environmentally adjusted fatigue CUF values for these locations using stress-based fatigue monitoring implemented by the Fatigue Monitoring Program.

- Surge Line Hot Leg Nozzle
- Pressurizer Heater Penetrations
- Pressurizer Surge Line Nozzles
- Charging Nozzles
- Safety Injection Nozzles
- Accumulator / RHR Nozzles

NRC Branch Technical Position MEB 3-1 is the basis for the VEGP criteria for the postulation of high-energy line breaks (HELBs), with the exception of lines that have eliminated postulated breaks based on Leak-Before-Break analysis. One of the criteria in MEB 3-1 for Class 1 piping is postulating pipe breaks at any intermediate locations where the CUF exceeds 0.1. The NRC staff has determined that this analysis qualifies as a TLAA.

VEGP determined that the there are no impacts of 60 years of operation on postulated HELB locations, with the possible exception of the charging and letdown lines. Prior to the period of extended operation, SNC will ensure the fatigue monitoring limits implemented as part of the Fatigue Monitoring Program are adequate to ensure that charging and letdown intermediate break location CUF values remain less than 0.1 for 60 years of operation.

In conclusion, the VEGP fatigue TLAAs for ASME Class 1 components have been evaluated and shown to remain valid or are adequately managed for the period of extended operation, in accordance with the demonstration methods of 10 CFR 54.21(c)(1)(i) and 10 CFR 54.21(c)(1)(iii). The Fatigue Monitoring Program monitors and tracks cyclic and transient occurrences and their severity, and performs CUF monitoring of selected components to ensure that Class 1 components are maintained within their fatigue design limits.

A.3.2.2 ASME Section III, Non-Class 1 Component Fatigue Analysis

The design of ASME III Code Class 2 and 3 piping systems at VEGP incorporates stress reduction factors for determining the acceptability of the piping design with respect to thermal stresses. Those in-scope components that are designed in accordance with ASME B31.1 requirements also incorporate stress reduction factors based upon an assumed number of thermal expansion cycles. In general, 7,000 full-temperature thermal cycles are assumed in the calculation of the thermal expansion stress, leading to a stress reduction factor of 1.0 in the stress analyses.

SNC evaluated the validity of this assumption of 7,000 full-temperature thermal cycles for 60 years of plant operation. The results of this evaluation indicate that the 7,000 thermal cycle assumption remains valid and bounding for 60 years of operation. Therefore, the existing pipe stress calculations are valid for the extended period of operation in accordance with 10 CFR 54.21(c)(1)(i).

A.3.2.3 Reactor Coolant Pump Flywheel Fatigue

A calculation was performed for the VEGP reactor coolant pump flywheels which assumes that each pump will be subjected to 6,000 start/stop cycles over a 60 year life. Current projections indicate that the 6,000 start/stop cycles will remain bounding for 60 years of operation by a large margin. Therefore, fatigue of the reactor coolant pump flywheels is demonstrated in accordance with 10 CFR 54.21(c)(1)(i).

A.3.2.4 Fatigue of Reactor Vessel Supports

The Westinghouse Generic Technical Report WCAP 14422, Revision 2a, identifies fatigue of reactor vessel supports as a potential TLAA if the supports of the reactor vessel were constructed in accordance with the 1963 version of the AISC. In the SER for this WCAP, the NRC indicated that licensees must ensure that a later version of the AISC was used. The design of VEGP used the 1969 version of the AISC, and therefore, the existing analysis is adequate for the extended term of operation, and is therefore demonstrated in accordance with 10 CFR 54.21(c)(1)(i).

A.3.2.5 Fatigue of Steam Generator Secondary Manway and Handhole Bolts

Westinghouse performed a fatigue calculation for steam generator secondary manway and handhole bolts that assumed the same cycles used for Class 1 component fatigue evaluations. That calculation resulted in a qualified life for the manway bolts of only 20 years. In 1993, it was determined that after Low-Temperature Rerate, the qualified life of the manway bolts would be reduced to 14.5 years. A new secondary side manway and handhole bolts fatigue evaluation was performed based on actual cycles to qualify the bolts for 40 years with rerating.

To ensure that the cycle limits for these bolts are not exceeded, SNC will replace both the secondary side manway bolts and the handhole bolts after 30 years of service, unless a less restrictive replacement schedule is developed and documented based on updated analyses initiated by the Bolting Integrity Program. SNC considers this fatigue evaluation a TLAA that is managed by the Bolting Integrity Program. Therefore, this TLAA is demonstrated in accordance with10 CFR 54.21(c)(1)(iii).

A.3.2.6 Fatigue of Reactor Vessel Internals

A fatigue analysis of the reactor vessel internals was not required when VEGP was originally designed. However, as part of rerating, Westinghouse performed a fatigue calculation for reactor vessel internals that assumed the same cycles used for Class 1 component fatigue evaluations and resulted in CUFs less than 1.0 for all subcomponents evaluated.

VEGP evaluated this TLAA for the extended period of operation. Since the analysis utilized the same design transients as the Class 1 component evaluations, the evaluation of the ASME Class 1 piping and component design transient cycles is also applicable to the reactor vessel internals. Therefore, design cycles for the transients applicable to the reactor vessel internals have been shown to be conservative and the fatigue analysis remain valid for the period of extended operation. This TLAA is demonstrated in accordance with 10 CFR 54.21(c)(1)(i).

A.3.3 ENVIRONMENTAL QUALIFICATION CALCULATIONS

The NRC has established environmental qualification (EQ) requirements in 10 CFR Part 50 Appendix A and in 10 CFR 50.49. The Environmental Qualification Program for VEGP has been established to demonstrate that certain electrical components are qualified to perform safety functions in the harsh environment following a DBA. Elements of the proof of qualification involve the original 40 year license period. Hence the qualification reports and calculations that comprise the EQ Program meet the definition of a TLAA. Qualified lives for EQ components have already been determined, and these components are tracked to determine when they are nearing the end of their qualified lives. For those components that are nearing the end of their qualified lives, the EQ Program has provisions for the component to be re-evaluated for longer service, refurbished, re-qualified, or replaced. The EQ Program will be continued through the period of extended operation. Therefore, this TLAA is demonstrated in accordance with 10 CFR 54.21(c)(1)(iii).

A.3.4 CONTAINMENT TENDON PRE-STRESS ANALYSIS

To meet the requirements on 10 CFR 50.55a (b)(2)(ix)(B), SNC uses an analysis to predict the amount of residual pre-stress in the containment tendons for VEGP. This analysis meets the definition of a TLAA. SNC extended the analysis to estimate the amount of residual pre-stress on the tendons after 60 years of operation. The analysis results conclude that acceptable containment tendon pre-stress will be retained throughout the period of extended operation. Therefore, adequate containment pre-stress for the period of extended operation is demonstrated in accordance with 10 CFR 54.21(c)(1)(ii).

Results from containment tendon surveillances conducted under the Inservice Inspection Program – IWL periodically update the analysis and confirm pre-stresses remain above the minimum required values.

A.3.5 PENETRATION LOAD CYCLES

A fatigue analysis was required for some of the VEGP containment penetrations. Those analyses qualify as TLAAs. Review of the transient assumptions for those evaluations against the transient assumptions for Class 1 component fatigue determined that none of the cycles assumed in the penetration fatigue analyses will be exceeded within the period of extended operation. Therefore, fatigue analyses for containment penetrations are acceptable without revision and the TLAAs are demonstrated in accordance with 10 CFR 54.21(c)(1)(i).

A.3.6 OTHER PLANT SPECIFIC ANALYSIS

A.3.6.1 Leak-Before-Break Analysis

Plant specific leak-before-break (LBB) analyses have been performed for both VEGP units. These analyses provide the technical justification for changes to the structural design basis involving protection against the effects of postulated pipe ruptures and are identified as TLAAs since they include assumptions regarding fatigue cycles and material fracture toughness properties.

VEGP LBB analyses exist for the Units 1 and 2 reactor coolant loop piping, the pressurizer surge line, the Unit 2 accumulator injection line, and the Unit 2 RHR branch connection line.

The LBB analyses for the pressurizer surge line and the Unit 2 RHR branch connection line were reviewed and determined to be acceptable without revision for the period of extended operation. Therefore, these LBB analyses are demonstrated in accordance with 10 CFR 54.21(c)(1)(i).

The analyses for the primary coolant loops and the Unit 2 accumulator line have been evaluated and updated to address operation through 60 years, including reductions in cast material fracture toughness properties due to thermal aging. Therefore, these LBB analyses are demonstrated in accordance with 10 CFR 54.21(c)(1)(ii).

A.3.6.2 Fuel Oil Storage Tank Corrosion Allowance

VEGP UFSAR, Section 9.5.4.2.1.1, states that the Diesel Fuel Oil Storage Tanks are not provided with cathodic protection and that therefore a liberal corrosion allowance of one-eighth inch has been provided. Georgia Power’s response to NRC SER Open Item 10 for the UFSAR demonstrated that there is sufficient corrosion allowance in the buried fuel oil storage tanks and associated piping given an assumed failure size in the coatings of the equipment. That response assumed a 40 year operating life. Substituting 60 years into the calculations indicates that the 1/8” corrosion allowance will not be exceeded during the period of extended operation.

However, independent of these corrosion allowance analyses, SNC credits the Buried Piping and Tanks Inspection Program to manage externally initiated corrosion of the Diesel Fuel Oil Storage Tanks during the period of extended operation. Therefore, SNC conservatively dispositions this TLAA in accordance with 10 CFR 54.21(c)(1)(iii).

A.3.6.3 Steam Generator Tube, Loss of Material

VEGP UFSAR Section 5.4.2 describes allowances for erosion and corrosion that are partially based upon a measured loss of material rate for 40 years. These allowances are used as inputs to demonstrate that stress limits established by Regulatory Guide 1.121 continue to be satisfied. UFSAR Section 5.4.2 demonstrates that a large margin exists between the allowable tube wall degradation which satisfies Regulatory Guide 1.121 limits and the tube plug limits established by the VEGP Steam Generator Tubing Integrity Program. Increasing the expected corrosion allowance to address the period of extended operation has an insignificant effect on this margin. Further, steam generator tubing wall loss is managed by the Steam Generator Tubing Integrity Program and the requirements of Regulatory Guide 1.121 are considered within that program.

Therefore, this TLAA is managed by the Steam Generator Tubing Integrity Program and is demonstrated in accordance with 10 CFR 54. 21(c)(1)(iii).

A.3.6.4 Cold Overpressure Protection System

As described in Section 5.2.2.10 of the VEGP UFSAR, VEGP has a cold overpressure mitigation system (COPS). A calculation has been performed to confirm that the setpoints will maintain the system pressure within the established limits when the pressure difference between the pressure transmitter and reactor midplane and maximum temperature/pressure instrument uncertainties are applied to the setpoints. This calculation meets the definition of a TLAA.

The P-T limit curves in the VEGP Pressure-Temperature Limits Report (PTLR) have been evaluated for 36 EFPY. When a revision to the PTLR is issued, the cold overpressure mitigation system setpoints will also be updated to reflect the period covered by the PTLR revision. Therefore, this cold overpressure mitigation setpoint calculation TLAA is demonstrated in accordance with 10 CFR 54.21(c)(1)(ii).

As described in the PTLR, the Reactor Vessel Surveillance Program updates the P-T limit curves considering the data gained from capsules SNC pulls, and the content and update of the PTLR is in accordance with VEGP Technical Specifications, Section 5.6.6. The associated COPS setpoints are also updated as operational needs dictate to bound the current level of neutron embrittlement (i.e., EFPY) for the unit. Therefore, this TLAA demonstration is made in accordance with 10 CFR 54.21(c)(1)(ii) and (iii).

The VEGP PTLR (for each unit) will be updated to address neutron embrittlement for a 60-year operating life, including any changes to the cold-overpressure mitigation system setpoints, prior to the unit entering the period of extended operation.

APPENDIX B AGING MANAGEMENT PROGRAMS AND ACTIVITIES

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B.3.35 Non-EQ Inaccessible Medium-Voltage Cables Program B-125
B.3.36 Non-EQ Cable Connections One-Time Inspection Program B-127
B.3.37 Environmental Qualification Program B-130
B.3.38 Fatigue Monitoring Program B-133

B.1.0 INTRODUCTION

The aging management review results for VEGP's integrated plant assessment are presented in Sections 3.1 through 3.6 of this application. The programs credited in the integrated plant assessment (IPA) for managing aging effects during the period of extended operation are described in this appendix.

Appendix B provides descriptions of these aging management programs which include existing programs and new programs. Enhancements to existing programs are identified where applicable.

Table B.1-1 provides a complete listing of the VEGP aging management programs for license renewal.

Table B.2-1 identifies the correlation of the VEGP aging management programs to the programs in NUREG-1801.

B.1.1 AGING MANAGEMENT PROGRAM OVERVIEW

The aging management programs described in this appendix have ten elements in accordance with the guidance in NUREG-1800, Appendix A.1, "Aging Management Review - Generic," Table A.1-1, "Elements of an Aging Management Program for License Renewal." For the VEGP aging management programs that are comparable to the programs described in Sections X and XI of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Volume 2, the elements have been compared to the elements of the NUREG-1801 program and the comparison results are presented in the program evaluation. For plant-specific programs which do not correlate with NUREG-1801, the ten elements from Table A.1-1 of NUREG-1800 are addressed in the program evaluation.

B.1.2 PRESENTATION METHOD

For aging management programs that are comparable to programs described in NUREG-1801 Volume 2, Sections X and XI, VEGP presents each program discussion in the following format:

- **Program Description:** Program summary description.
- **NUREG-1801 Consistency:** Summary of the degree of consistency between the VEGP aging management program and the corresponding NUREG-1801 program.
- **Exceptions to NUREG-1801:** Statement of exception(s) to the comparable NUREG-1801 program and, where applicable, a justification.
- **Enhancements:** Statement of any future enhancement(s) needed to attain consistency with the comparable NUREG-1801 program, or additional features VEGP deems necessary for program adequacy.
- **Operating Experience:** Operating experience information relevant to the program.
- **Conclusion:** Conclusion statement of program adequacy.

Table B.2-1 identifies the correlation of the VEGP aging management programs to the programs in NUREG-1801.

For plant-specific programs, the program descriptions include a program summary description, evaluations for each of the ten program attributes described in NUREG-1800, and a conclusion.

B.1.3 AGING MANAGEMENT PROGRAM QUALITY CONTROL ATTRIBUTES

The Quality Assurance Program applicable to VEGP implements the requirements of 10 CFR 50, Appendix B, which is consistent with the summary in Appendix A.2 of NUREG-1800. The Quality Assurance Program controls are applicable to the aging management programs for the systems, structures, and components that are subject to an aging management review (AMR) for license renewal. The Quality Assurance Program includes the elements of corrective action, confirmation process, and administrative controls, as described below.

Corrective Actions

VEGP applies a single corrective actions process, regardless of the safety classification of the system, structure or component. Corrective actions are initiated in accordance with procedures established to implement 10 CFR 50, Appendix B.

The corrective actions process requires documentation of actual or potential problems including, but not limited to, unexpected plant equipment degradation, damage, failure, or malfunction. When an acceptance criteria is not met, the condition is documented and appropriate corrective actions are taken in accordance with the corrective actions process.

Confirmation Process

The focus of the VEGP confirmation process is verifying effective implementation of corrective actions. Effectiveness is measured in terms of correcting the adverse condition and precluding repetition of significant conditions adverse to quality.

The corrective actions process include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause determinations and prevention of recurrence where appropriate. Corrective Action Program procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions have been implemented. The Quality Assurance Program audits program compliance.

The corrective actions process monitors for potentially adverse trends. Identification of an adverse trend results in initiation of corrective actions.

Administrative Controls

The quality assurance (QA) procedures, review and approval processes, and administrative controls applicable to the aging management programs and activities credited for license renewal are implemented in accordance with requirements of 10 CFR Part 50, Appendix B. The existing administrative controls require written procedures and other forms of administrative controls for these program activities.

B.1.4 PROGRAM OPERATING EXPERIENCE

SNC reviewed both industry and plant specific operating experience (OE). The OE review included industry documents, generic communications from the NRC, the VEGP Condition Reporting database, NRC inspection reports, and VEGP inspection results reports. The SNC license renewal staff solicited input from system engineers, applicable plant personnel and subject matter experts to ensure that relevant operating experience was captured. NUREG-1801 incorporates applicable industry operating experience up through its 2005 issuance date and was a major input for industry OE.

The license renewal review considered existing aging management programs, including the application of past corrective actions that resulted in program enhancements. While no VEGP programmatic operating experience may exist for a new program, there may be pertinent operating experience that relates to the new program.

VEGP evaluates applicable industry and plant specific operating experience on an ongoing basis. These evaluations will continue during the period of extended operation.

B.1.5 AGING MANAGEMENT PROGRAMS

Table B.1-1 lists the aging management programs SNC credits for managing the effects of aging during the period of extended operation. The programs are described as new or existing. Program enhancements credited for license renewal are described in the discussion of the program in the referenced section.

Table B.2-1 identifies the correlation of the VEGP aging management programs to the programs in NUREG-1801.

Table B.1-1 Aging Management Programs

VEGP Aging Management Programs	New or Existing	App. B Section
VEGP Mechanical Aging Management Programs		
ACCW System Carbon Steel Components Program	**New**	B.3.1
Bolting Integrity Program	**New**	B.3.2
Boric Acid Corrosion Control Program	**Existing**	B.3.3
Buried Piping and Tanks Inspection Program	**New**	B.3.4
CASS RCS Fitting Evaluation Program	**New**	B.3.5
Closed Cooling Water Program	**Existing**	B.3.6
Diesel Fuel Oil Program	**Existing**	B.3.7
External Surfaces Monitoring Program	**New**	B.3.8
Fire Protection Program	**Existing**	B.3.9
Flow-Accelerated Corrosion Program	**Existing**	B.3.10
Flux Thimble Tube Inspection Program	**Existing**	B.3.11
Generic Letter 89-13 Program	**Existing**	B.3.12
Inservice Inspection Program	**Existing**	B.3.13
Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations	**New**	B.3.14
Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations	**Existing**	B.3.15
Oil Analysis Program	**Existing**	B.3.16
One-Time Inspection Program	**New**	B.3.17
One-Time Inspection Program for ASME Class 1 Small Bore Piping	**New**	B.3.18
One-Time Inspection Program for Selective Leaching	**New**	B.3.19
Overhead and Refueling Crane Inspection Program	**Existing**	B.3.20
Periodic Surveillance and Preventive Maintenance Activities	**Existing**	B.3.21
Piping and Duct Internal Inspection Program	**New**	B.3.22

Table B.1-1, cont'd Aging Management Programs

VEGP Aging Management Programs	New or Existing	App. B Section
Reactor Vessel Closure Head Stud Program	**Existing**	B.3.23
Reactor Vessel Internals Program	**New**	B.3.24
Reactor Vessel Surveillance Program	**Existing**	B.3.25
Steam Generator Tubing Integrity Program	**Existing**	B.3.26
Steam Generator Program for Upper Internals	**Existing**	B.3.27
Water Chemistry Control Program	**Existing**	B.3.28
VEGP Civil/Structural Aging Management Programs		
10 CFR 50 Appendix J Program	**Existing**	B.3.29
Inservice Inspection Program – IWE	**Existing**	B.3.30
Inservice Inspection Program – IWL	**Existing**	B.3.31
Structural Monitoring Program	**Existing**	B.3.32
Structural Monitoring Program – Masonry Walls	**Existing**	B.3.33
VEGP Electrical Aging Management Programs		
Non-EQ Cables and Connections Program	**New**	B.3.34
Non-EQ Inaccessible Medium-Voltage Cables Program	**New**	B.3.35
Non-EQ Cable Connections One-Time Inspection Program	**New**	B.3.36
VEGP TLAA Aging Management Programs		
Environmental Qualification Program	**Existing**	B.3.37
Fatigue Monitoring Program	**Existing**	B.3.38

B.2.0 AGING MANAGEMENT PROGRAM CORRELATION TO NUREG-1801

The general correlation between aging management programs suggested in NUREG-1801 and the VEGP programs is illustrated in Table B.2-1. Where applicable, references to appropriate sections of this appendix are provided.

Table B2-1 Correlation between NUREG-1801 and VEGP Programs

NUREG-1801 Number	NUREG-1801 Program	VEGP Program
Mechanical Programs		
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	See the plant-specific Inservice Inspection Program
XI.M2	Water Chemistry	Water Chemistry Control Program
XI.M3	Reactor Head Closure Studs	Reactor Vessel Closure Head Stud Program
XI.M4	BWR Vessel ID Attachment Welds	Not applicable, VEGP is a PWR.
XI.M5	BWR Feedwater Nozzle	Not applicable, VEGP is a PWR.
XI.M6	BWR Control Rod Drive Return Line Nozzle	Not applicable, VEGP is a PWR.
XI.M7	BWR Stress Corrosion Cracking	Not applicable, VEGP is a PWR.
XI.M8	BWR Penetrations	Not applicable, VEGP is a PWR.
XI.M9	BWR Vessel Internals	Not applicable, VEGP is a PWR.
XI.M10	Boric Acid Corrosion	Boric Acid Corrosion Control Program
XI.M11A	Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors	See the plant-specific Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	CASS RCS Fitting Evaluation Program
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	See the plant-specific Reactor Vessel Internals Program
XI.M14	Loose Part Monitoring	Not credited for license renewal

Table B2-1 (Cont'd) Correlation between NUREG-1801 and VEGP Programs

NUREG-1801 Number	NUREG-1801 Program	VEGP Program
XI.M15	Neutron Noise Monitoring	Not credited for license renewal
XI.M16	PWR Vessel Internals	Reactor Vessel Internals Program
XI.M17	Flow-Accelerated Corrosion	Flow-Accelerated Corrosion Program
XI.M18	Bolting Integrity	See the plant specific Bolting Integrity Program
XI.M19	Steam Generator Tube Integrity	Steam Generator Tubing Integrity Program
XI.M20	Open-Cycle Cooling Water System	Generic Letter 89-13 Program
XI.M21	Closed-Cycle Cooling Water System	Closed Cooling Water Program
XI.M22	Boraflex Monitoring	Not credited for license renewal
XI.M23	Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems	Overhead and Refueling Crane Inspection Program
XI.M24	Compressed Air Monitoring	Not credited for license renewal
XI.M25	BWR Reactor Water Cleanup System	Not applicable, VEGP is a PWR.
XI.M26	Fire Protection	Fire Protection Program
XI.M27	Fire Water System	Fire Protection Program
XI.M28	Buried Piping and Tanks Surveillance	Not credited for license renewal
XI.M29	Aboveground Steel Tanks	Not credited for license renewal
XI.M30	Fuel Oil Chemistry	See the plant specific Diesel Fuel Oil Program
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance Program
XI.M32	One-Time Inspection	One-Time Inspection Program
XI.M33	Selective Leaching of Materials	One-Time Inspection Program for Selective Leaching

Table B2-1 (Cont'd) Correlation between NUREG-1801 and VEGP Programs

NUREG-1801 Number	NUREG-1801 Program	VEGP Program
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tanks Inspection Program
XI.M35	One-Time Inspection of ASME Code Class 1 Small-Bore Piping	One-Time Inspection Program for ASME Class 1 Small Bore Piping
XI.M36	External Surfaces Monitoring	External Surfaces Monitoring Program
XI.M37	Flux Thimble Tube Inspection	Flux Thimble Tube Inspection Program
XI.M38	Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Piping and Duct Internal Inspection Program
XI.M39	Lubricating Oil Analysis	Oil Analysis Program
Structural Programs		
XI.S1	ASME Section XI, Subsection IWE	See the plant specific Inservice Inspection Program – IWE
XI.S2	ASME Section XI, Subsection IWL	See the plant specific Inservice Inspection Program – IWL
XI.S3	ASME Section XI, Subsection IWF	See the plant specific Inservice Inspection Program – IWB, IWC, IWD, IWF
XI.S4	10 CFR 50, Appendix J	10 CFR 50, Appendix J Program
XI.S5	Masonry Wall Program	Structural Monitoring Program – Masonry Walls
XI.S6	Structures Monitoring Program	Structural Monitoring Program
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plants	Not credited for license renewal
XI.S8	Protective Coating Monitoring and Maintenance Program	Not credited for license renewal

Table B2-1 (Cont'd) Correlation between NUREG-1801 and VEGP Programs

NUREG-1801 Number	NUREG-1801 Program	VEGP Program
Electrical Programs		
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Non-EQ Cables Program
XI.E2	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Not credited for license renewal
XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Non-EQ Medium Voltage Cables Program
XI.E4	Metal Enclosed Bus	Not credited for license renewal
XI.E5	Fuse Holders	Not credited for license renewal
XI.E6	Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirement	See the plant specific Non-EQ Cable Connections One-Time Inspection Program
TLAA Programs		
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Fatigue Monitoring Program
X.S1	Concrete Containment Tendon Prestress	Managed by TLAA. Tendons are inspected and tested under the plant specific Inservice Inspection Program – IWL.
X.E1	Environmental Qualification (EQ) of Electrical Components	Environmental Qualification Program

Table B2-1 (Cont'd) Correlation between NUREG-1801 and VEGP Programs

NUREG-1801 Number	NUREG-1801 Program	VEGP Program
Plant Specific Programs		
NA	Plant Specific Program	ACCW System Carbon Steel Components Program
NA	Plant Specific Program	Bolting Integrity Program
NA	Plant Specific Program	Diesel Fuel Oil Program
NA	Plant Specific Program	Inservice Inspection Program - IWB, IWC, IWD, IWF
NA	Plant Specific Program	Inservice Inspection Program - IWE
NA	Plant Specific Program	Inservice Inspection Program - IWL
NA	Plant Specific Program	Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations
NA	Plant Specific Program	Non-EQ Cable Connections One-Time Inspection Program
NA	Plant Specific Program	Periodic Surveillance and Preventive Maintenance Activities
NA	Plant Specific Program	Reactor Vessel Internals Program

B.3.0 AGING MANAGEMENT PROGRAM DESCRIPTIONS

B.3.1 ACCW SYSTEM CARBON STEEL COMPONENTS PROGRAM

Program Description

The ACCW System Carbon Steel Components Program is a new plant-specific program. The program manages cracking of carbon steel components exposed to auxiliary component cooling water through a combination of leakage monitoring and routine and periodic inspections. The program is in response to operating experience related to nitrite induced stress corrosion cracking (SCC) and subsequent component leakage in the VEGP Auxiliary Component Cooling Water (ACCW) System components. The scope of this program is the carbon steel components exposed to auxiliary component cooling water. This includes the VEGP Unit 1 and Unit 2 ACCW Systems as well as carbon steel components serviced by the ACCW systems. The ACCW system services nonsafety-related heat loads.

While there has not been any nitrite induced SCC identified in the Unit 1 ACCW System, nitrite induced SCC has been identified in the Unit 2 ACCW System. The Unit 1 ACCW System is conservatively included in the scope of this program due to the similarities in chemistry control regime, normal operating temperatures, materials of construction, and design.

The program includes formalization of some existing VEGP activities and new activities. The program relies upon leakage detection monitoring, routine walkdowns, and periodic visual examinations. Operating experience indicates that ACCW system leaks attributed to nitrite induced SCC are detected and repaired prior to a loss of the system intended function. All leaks have been detected prior to any significant impact on system pressure, flow and integrity.

The program also includes preventive measures applicable to repairs and modifications intended to minimize crack initiation sites, lower stresses, and improve inspectability.

The ACCW System Carbon Steel Components Program will be implemented prior to the period of extended operation.

Program Scope

The carbon steel components in both the VEGP Unit 1 and Unit 2 ACCW Systems, and the carbon steel components serviced by the ACCW systems, are included within the scope of this program. While the higher temperature and higher stress portions of the ACCW System are considered the critical locations where nitrite induced SCC is expected, all of the carbon steel components exposed to ACCW are conservatively included within the scope of this program.

This program is necessitated by VEGP operating experience with nitrite induced SCC in the Unit 2 ACCW System. While there have not been any nitrite induced SCC leaks to date in the

Unit 1 ACCW System, this system is conservatively included in the scope of this program due to the similar chemistry control regime, normal operating temperatures, materials of construction, and design.

Preventive Actions

The ACCW System Carbon Steel Components Program includes the following design controls on ACCW System carbon steel component repairs and new installations that are intended to prevent recurrence of SCC:

- New installations and component repairs will be performed with the intent to avoid the creation of crevices, which have been shown by operating experience to serve as SCC initiation sites. Backing rings will not be used in pipe butt-welded piping. For critical locations (high temperature and/or stress), socket welds will be avoided when possible.
- Actions will be taken to reduce system stresses in new installations and component repairs, where practical. New installation and component repair processes will include guidance intended to reduce assembly stresses.

Parameters Monitored or Inspected

The ACCW System Carbon Steel Components Program inspects and monitors for leakage of ACCW components, which is indicative of through wall cracking due to nitrite induced SCC. Parameters monitored include indications of component leakage based on visual observations, system make-up needs, room leakage alarms, and visual inspections.

Detection of Aging Effects

VEGP operating experience and industry data indicate that detection of nitrite induced SCC is difficult prior to system leakage. VEGP operating experience indicates that detection of leakage is possible well before leaks reach a size that can significantly impact system integrity. The following detection methods are included in the ACCW System Carbon Steel Components Program.

- ACCW surge tank low-level alarms. Alarms and indication are credited to identify significant system leakage. Abnormal changes in tank level are investigated by the Operations staff and significant leaks identified.
- Leakage detection systems for the locations of ACCW components and equipment served by ACCW are monitored. Abnormal indications are cause for investigation by the Operations staff to determine the leakage source.
    - Containment leakage monitoring. Identifies ACCW system leakage during power operations when the containment is inaccessible.

  - Leakage monitoring systems for other locations with ACCW components and equipment served by ACCW. Sumps and floor drain tanks are monitored.

- Visual observations of accessible areas by Operations Department personnel during routine rounds. Operations Department personnel conduct rounds of the areas containing the accessible portions of the ACCW Systems which would detect evidence of leakage.
- ACCW system engineer walkdown visual inspections of the accessible portions of the ACCW system.
- Periodic visual inspections of the external surfaces of the ACCW System performed under the External Surfaces Monitoring Program (Appendix B.3.8). The program's inspection criteria include looking for signs of system leakage.
- VT-2 visual examinations are performed periodically at normal operating pressures for the safety-related portions of the system as part of the Inservice Inspection Program (Appendix B.3.13).

Monitoring and Trending

ACCW surge tank levels are monitored. Alarms are continuously monitored, and containment leakage is trended.

Operations Department personnel conduct rounds of the accessible portions of the ACCW System at least daily.

The ACCW system engineer walkdown inspections are performed at least once per refueling cycle with the system at normal operating pressure.

Inaccessible portions are inspected when made accessible.

Acceptance Criteria

For visual inspections, no indications of leakage are acceptable.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

For each of the leakage events described below, the leakage was identified prior to any significant effect on ACCW system pressure and flow. This data serves as an indication that leakage monitoring is a viable detection methodology. This phenomenon is not well understood and reliable UT technologies have not yet been developed.

The Unit 2 letdown heat exchanger experienced several leakage events from 2001 through 2003, resulting in the replacement of this heat exchanger in 2004. The letdown heat exchanger leaks were predominantly initiated in creviced areas corresponding to internal baffles. All letdown heat exchanger leaks were identified prior to a loss of component intended function. Leakage rates were typically in the drops per minute range and were identified by investigation of room drain alarms.

In 2003, a leak was identified in an 8” NPS butt weld in the return line from the letdown heat exchanger. Metallurgical examination of this weld indicated evidence of stress corrosion cracking, initiated in the crevice formed by a weld backing ring. The leakage rate was in the drops per minute range. The leaks were identified during operator rounds in the Auxiliary Building.

Also in 2003, two leaks were discovered in socket welds in the ACCW return line from the normal charging pump motor coolers. Both of these failures were linked to high stresses resulting from flange misalignment. One of the leak locations was in a dead-ended line, while the other leak location was in the main flow line. One of the leak locations was issuing a steady stream of water at the time of identification, but still well within the makeup capacity of the ACCW system. Both of these leaks were identified during a walkdown of the ACCW system.

In 2004, two leaks were discovered in socket welds associated with heat exchanger drain lines for the Unit 2 ACCW heat exchangers. One leak was identified on Train A and one leak on Train B. Both of the leaks were in the drops per minute range. These leaks were discovered during heat exchanger walkdowns. While these welds were not sent offsite for metallurgical analysis, SCC is presumed to have played a role in these failures based on system history.

Enhancements

None

Conclusion

The VEGP ACCW System Carbon Steel Components Program will provide reasonable assurance that cracking of ACCW System carbon steel components due to nitrite induced SCC will be adequately managed such that the components included within the scope of this program will continue to perform their intended function during the period of extended operation.

B.3.2 BOLTING INTEGRITY PROGRAM

Program Description

The VEGP Bolting Integrity Program is a new plant-specific program to manage cracking, loss of material, and loss of preload in mechanical bolted closures. The program includes formalization of existing site activities and new activities, consolidated into an integrated program to address mechanical bolting concerns.

The VEGP Bolting Integrity Program applies to safety-related and nonsafety-related bolting for pressure-retaining components within the scope of license renewal, with the exception of the reactor vessel head studs which are addressed by the Reactor Vessel Head Closure Stud Program.

Preventive aspects of the program include use of appropriate bolting and torquing practices, including control of thread lubricants. Periodic replacement of steam generator manway and handhole bolting is also included in the scope of the program as a preventive measure for managing cumulative fatigue damage for these fasteners. The program's bolting and torquing practices are based on industry guidelines, vendor recommendations, and VEGP operating experience appropriate for the VEGP applications. Consistent with NUREG-1339 recommendations, the use of lubricants containing molybdenum disulfide, which has been specifically implicated in stress corrosion cracking of bolting, is prohibited by the program.

The program also includes periodic inspection of closure bolting assemblies to detect signs of leakage that may be indicative of loss of preload, loss of material, or crack initiation. Periodic inspection of bolted closures in conjunction with the Inservice Inspection Program and External Surfaces Monitoring Program will detect the effects of aging and joint leakage. Operator rounds and system walkdowns will also identify joint leakage.

Evaluation of borated water leaks and subsequent impact on bolted connections is managed separately as a part of the VEGP Boric Acid Corrosion Control Program (Appendix B.3.3).

The VEGP Bolting Integrity Program does not include material selection and manufacturing controls. The design process controls these activities.

The VEGP Bolting Integrity Program will be implemented prior to the period of extended operation.

Program Scope

The program scope includes all mechanical discipline pressure boundary bolted connections within the scope of license renewal, with the exception of the reactor vessel head studs. The head studs are managed by the Reactor Vessel Closure Head Stud Program (Appendix B.3.23).

Consistent with the intent of NUREG-1339, fasteners determined to have actual yield strength values equal to or greater than 150 ksi (and which are loaded in tension) are considered susceptible to SCC.

Preventive Actions

Bolting and torquing practices and related guidance will be based on industry guidelines such as the EPRI Bolting Guidelines, vendor recommendations, and VEGP operating experience. Over the years EPRI has published various guides that provide instruction regarding design, installation, and maintenance of bolted closures. These guidelines include EPRI NP-5067, “Good Bolting Practices: A Reference Manual for Nuclear Power Plant Maintenance Personnel,” EPRI TR-104213, “Bolted Joint Maintenance and Applications Guide,” and other, more specific guidelines. At times, these guidelines provide contradictory recommendations. VEGP will use the appropriate guidance to the VEGP applications. In addition to industry guidelines, the program will also incorporate specific guidance from component vendors, and from VEGP operating experience, into the program.

Control of bolt preload through the application of good bolted joint application practices is effective in minimizing the potential for cracking due to SCC.

Application of lubricants will be controlled to ensure that approved, stable lubricants are specified. Approved lubricants lists will be updated based on new industry operating experience and research data. Consistent with NUREG-1339 recommendations, the use of Molybdenum Disulfide, which has been specifically implicated in SCC of bolting, will be specifically prohibited by the program.

Aggressive environments are minimized by identification of significant leakage during operator rounds. Timely detection and correction of leakage events minimizes the potential for degradation of bolted connections.

Periodic replacement of steam generator secondary side manway and handhole bolts is performed to manage cumulative fatigue damage – see discussion in Section 4.3.5. This approach ensures the number of transient cycles remain conservative with respect to the current fatigue analyses. The current replacement schedule is 30 years of service life. The replacement schedule may be adjusted based on updated analyses initiated by the program. This replacement activity is tracked in the Steam Generator Program strategic plan.

Parameters Monitored or Inspected

Parameters related to proper bolt torque and joint alignment are monitored during joint installation and maintenance activities.

Loss of preload as evidenced by leakage, loss of material, and cracking are detected by operator rounds and by visual and non-visual examinations as specified by the VEGP Inservice Inspection Program and External Surfaces Monitoring Program.

Detection of Aging Effects

Periodic inspections in conjunction with the following activities detect the effects of aging and joint leakage.

Operator rounds periodically monitor bolted connections for signs of leakage due to loss of preload.

Visual inspections are conducted to detect loss of preload resulting in joint leakage and to detect fastener degradation due to cracking or loss of material. Safety-related fasteners are inspected in conjunction with the Inservice Inspection Program (Appendix B.3.13) using the inspection techniques specified in ASME Section XI, Subsections IWB, IWC, and IWD.

Carbon steel, alloy steel, and copper alloy fasteners subject to loss of material are inspected in conjunction with the External Surfaces Monitoring Program (Appendix B.3.8) using general visual examination techniques to detect leakage and corrosion of bolted closures. Inspections to identify joint leakage will focus on bolted connections in high temperature or high pressure service where leakage is most likely.

Monitoring and Trending

Operations department personnel periodically conduct rounds of accessible areas. System walkdowns are also periodically performed by the site engineering staff.

ISI Program inspection frequencies are established for each inspection interval consistent with ASME Section XI as specified in 10 CFR 50.55a(g)(4)(ii). Currently, the VEGP ISI Program is based on ASME Inservice Inspection Program B (IWA-2432). ISI results are recorded every operating cycle and provided to the NRC every period via Owner's Activity Reports.

General visual inspections are conducted periodically of both normally accessible and normally inaccessible areas, consistent with the External Surfaces Monitoring Program. Inspection intervals will be consistent with those specified by the External Surfaces Monitoring Program.

Acceptance Criteria

Any significant joint leakage identified during operator rounds or system walkdowns is unacceptable and entered into the corrective actions process.

For inspection of safety-related fasteners in conjunction with the ISI Program, acceptance standards will be consistent with Inservice Inspection Program acceptance standards as defined in ASME Section XI articles IWA-3000, IWB-3000, IWC-3000, and IWD-3000, as applicable.

For general visual inspections conducted by the External Surface Monitoring Program, indications of joint leakage, cracking, or significant corrosion of fasteners or joint mating surfaces is unacceptable and entered into the corrective actions process.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Corrective actions for leakage identified at safety-related bolted connections will be consistent with the Inservice Inspection Program as implemented consistent with the requirements of 10 CFR 50.55a.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

Industry operating experience has shown that bolted connections do not typically fail catastrophically, but are more likely to leak. Additionally, due to the redundancy provided by multiple fasteners, complete joint failure is not likely. Degradation of bolted connections in the industry has been primarily related to boric acid corrosion (which is addressed by the VEGP Boric Acid Corrosion Control Program), out of specification fasteners, and repetitive leakage events.

Recent VEGP operating experience associated with fasteners has included leakage due to loss of preload, corrosion of fasteners in environments experiencing wetting or condensation effects, loose or improperly torqued fasteners, and missing fasteners and locking pins. In a number of instances, carbon steel and alloy steel bolting have been replaced with corrosion resistant materials. Minor scratching and corrosion of flange surfaces has also been identified during maintenance to correct leaks. These results indicate that the redundancy of bolted connections, along with Inservice Inspection Program inspections and system walkdowns has resulted in effective identification of degradation prior to the loss of any intended function.

Reviews of recent experience did not identify any reports of bolt cracking due to stress corrosion cracking.

Operating experience relative to the evaluation and replacement of the SG secondary manway and handhole bolts is described under the TLAA discussion in Section 4.3.5.

The Bolting Integrity Program is based on industry practices and vendor recommendations for bolted connection installation and maintenance. The program will be updated to incorporate new updated guidance, as applicable to VEGP.

Enhancements

None

Conclusion

The VEGP Bolting Integrity Program, with enhancements as described above, will provide reasonable assurance that degradation of bolted connections will be adequately managed such that the components will continue to perform their intended function during the period of extended operation.

B.3.3 BORIC ACID CORROSION CONTROL PROGRAM

Program Description

The VEGP Boric Acid Corrosion Control (BACC) Program is an existing program that monitors the condition of components on which borated water may leak to ensure that borated water leakage and associated boric acid residue is identified, evaluated and removed before any loss of intended function of affected components. The program detects boric acid leakage by periodic visual inspection of systems containing borated water for evidence of leakage and by inspection of adjacent structures and components for evidence of leakage. The program was developed in response to the recommendations of Generic Letter 88-05. The program addresses operating experience contained in recent NRC generic communications, including program experience summarized in NRC Regulatory Issue Summary 2003-013.

The program consists of: (1) visual inspections of component surfaces that are potentially exposed to borated water leakage, (2) timely discovery of leak path and removal of boric acid residue, (3) assessment of the corrosion, and (4) follow-up inspection for adequacy of corrective actions.

Enhancements to the VEGP Boric Acid Corrosion Control (BACC) Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Boric Acid Corrosion Control Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.M10, “Boric Acid Corrosion”, with enhancements.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
1. Program Scope 6. Acceptance Criteria	The Boric Acid Corrosion Control Program scope and acceptance criteria will be enhanced to address the effects of borated water leakage on materials other than steels, including electrical components (e.g., electrical connectors) that are susceptible to boric acid corrosion.

Operating Experience

An assessment revealed that boric acid leaks had not been consistently identified and evaluated under the VEGP Boric Acid Program. Based on these findings, program enhancements were implemented to ensure that all boric acid leaks are identified with a condition report. Procedures were changed to clearly require personnel to write a condition report when boric acid leakage is discovered. Leaks outside of containment are flagged in the field with a problem marker. Additionally, Boric Acid Corrosion Control training is required for all VEGP site personnel.

During Reactor Pressure Vessel Head inspections performed in accordance with NRC First Revised Order EA-03-009, boron residue was observed. There was no evidence of head material wastage or of leaking or cracked nozzles. The boron residue was determined to be associated with previous cleaning and decontamination of conoseals and was not associated with new “active” leakage. The areas below the conoseals were cleaned and re-inspected during startup with no leakage observed.

Conclusion

Continued implementation of the VEGP Boric Acid Corrosion Control Program provides reasonable assurance that loss of material due to boric acid corrosion of carbon steel and low-alloy steel structures or components within the scope of license renewal will be adequately managed during the period of extended operation.

B.3.4 BURIED PIPING AND TANKS INSPECTION PROGRAM

Program Description

The Buried Piping and Tanks Inspection Program is a new program that manages loss of material from the external surfaces of buried carbon steel, cast iron, and stainless steel components. The program includes both preventive measures and visual inspections. Preventive measures consist of coatings and wrappings which are required by design in accordance with industry standards. Buried components in the scope of license renewal will be inspected when they are excavated for maintenance or when exposed for any other reason.

The program applies to the buried components in the scope of license renewal in the following systems.

- Emergency Diesel Generator System (buried fuel oil storage tanks and fuel oil transfer piping)
- Feedwater System (buried piping between the Condensate Storage Tanks and the condenser hotwells)
- Fire Protection System
- Nuclear Service Cooling Water System (buried sample lines between the NSCW Pumphouses and the NSCW Chemical Control Buildings)

Prior to entering the period of extended operation, a review will be performed to determine if at least one opportunistic or focused inspection of buried piping and tanks has been performed within the 10-year period prior to the period of extended operation. If an inspection did not occur, a focused inspection will be performed prior to the period of extended operation.

In addition, a focused inspection of buried piping and tanks will be performed within ten years after entering the period of extended operation, unless an engineering evaluation concludes that sufficient opportunistic and focused inspections have occurred during this time to demonstrate the ability of the underground coatings to protect the underground piping and tanks from degradation.

The Buried Piping and Tanks Inspection Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection Program is a new program that will be consistent with the program described in NUREG-1801, Section XI.M34, “Buried Piping and Tanks Inspection,” with exceptions.

Exceptions to NUREG-1801

The Buried Piping and Tanks Inspection Program will be consistent with the program described in NUREG-1801, Section XI.M34, “Buried Piping and Tanks Inspection,” with the following exceptions.

Elements Affected	Exception
1. Program Scope 3. Parameters Monitored/Inspected 10. Operating Experience	The VEGP Buried Piping and Tanks Inspection Program contains an exception to the scope of the GALL program in that the VEGP program addresses buried stainless steel piping in addition to buried steel piping and tanks.

Enhancements

None

Operating Experience

This is a new program, therefore no programmatic operating experience has been documented. The only leaks identified from buried components in the scope of license renewal were in buried fire protection components. These leaks were typically attributed to design, installation, or operational issues, and not age-related.

The VEGP program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. This industry experience-basis for the program assures that implementation of the Buried Piping and Tanks Inspection Program will adequately manage the effects of aging during the period of extended operation.

Conclusion

Implementation of the new VEGP Buried Piping and Tanks Inspection Program prior to the period of extended operation will provide reasonable assurance that the effects of aging on the external surfaces of buried components in the scope of License Renewal will be managed such that the pressure-retaining function of those components will be maintained during the period of extended operation.

B.3.5 CASS RCS FITTING EVALUATION PROGRAM

Program Description

The CASS RCS Fitting Evaluation Program is a new program that manages the effects of loss of fracture toughness due to thermal aging for susceptible cast austenitic stainless steel (CASS) components in the reactor coolant system (RCS). This program augments VEGP Inservice Inspection Program requirements.

This aging management program evaluates the susceptibility of CASS components to thermal aging embrittlement based on casting method, molybdenum content, and percent ferrite. Screening for susceptibility to thermal aging is not required for pump casings and valve bodies, based on the assessment documented in the letter dated May 19, 2000, from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Douglas Walters, Nuclear Energy Institute (NEI). The existing ASME Section XI inspection requirements, including the alternative requirements of ASME Code Case N-481 for pump casings, are adequate for all pump casings and valve bodies.

The program provides aging management through either a flaw tolerance evaluation or enhanced volumetric examination. Additional inspection or evaluations to demonstrate that the material has adequate fracture toughness are not required for components that are not susceptible to thermal aging embrittlement.

Based on screening consistent with the process specified in NUREG-1801, Rev. 1, Section XI.M12, the VEGP components that require additional aging management under this program are the VEGP Unit 1 Loop 4 RCP inlet elbow and the VEGP Unit 2 Loop 1 RCP inlet elbow. For these two castings, loss of fracture toughness due to thermal aging will be managed by component-specific flaw tolerance evaluation, additional inspections, or a combination of these techniques.

This program will not include the cast austenitic stainless steel bottom mounted instrumentation column cruciforms These reactor vessel internals components are managed by the Reactor Vessel Internals Program (Appendix B.3.24).

The CASS RCS Fitting Evaluation Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The Cast Austenitic Stainless Steel (CASS) RCS Fitting Evaluation Program will be consistent with the program described in NUREG-1801, Section XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS),” with an exception.

Exceptions to NUREG-1801

The VEGP Cast Austenitic Stainless Steel (CASS) RCS Fitting Evaluation Program will be consistent with the program described in NUREG-1801, Section XI.M12, “Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS),”with the following exception.

Elements Affected	Exception
5. Monitoring and Trending 6. Acceptance Criteria	Flaw tolerance evaluations and any inspections will be performed in accordance with the VEGP Inservice Inspection Program Code of Record at the time of the evaluation.(1)

(1) NUREG-1801, Section XI.M12, describes the program as conforming to the requirements of the ASME Code, Section XI, 2001 Edition including the 2002 and 2003 Addenda for flaw tolerance evaluation and inspections. The VEGP Inservice Inspection Program Code of Record will be consistent with the requirements of 10 CFR 50.55a. For the current inspection interval, the VEGP ISI Program uses ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda.

Enhancements

None

Operating Experience

The CASS RCS Fitting Evaluation Program is a new program for which there is no operating experience. To date, there has been no VEGP or industry field operating experience regarding degradation of austenitic stainless steel castings due to thermal aging.

The screening criteria in use by NUREG-1801 and by the VEGP RCS CASS Fitting Evaluation are based upon research data presented in NUREG/CR-4513, Rev. 1. Flaw tolerance evaluation criteria are conservative and are based on Section XI of the ASME B&PV Code. Because the ASME Code is a consensus document that has been widely used over a long period, it has been shown to be effective in managing aging effects in components and their integral attachments in light-water cooled power plants.

Conclusion

The VEGP CASS RCS Fitting Evaluation Program will provide reasonable assurance that loss of fracture toughness in RCS CASS components will be adequately managed such that the components included within the scope of this program will continue to perform their intended function during the period of extended operation.

B.3.6 CLOSED COOLING WATER PROGRAM

Program Description

The VEGP Closed Cooling Water Program is an existing program that manages loss of material, cracking, and reduction in heat transfer in closed-cycle cooling water systems and the components cooled by these systems.

The program includes maintenance of corrosion inhibitor, pH buffering agent, and biocide concentrations. Concentrations of detrimental ionic species are monitored and reduced if necessary. Important diagnostic parameters are monitored and evaluated for significant trends. The program also uses corrosion-monitoring activities including trending of iron and copper concentrations and component inspections. Corrosion rate monitoring methods may also be used.

The VEGP Closed Cooling Water Program is based on the EPRI closed cooling water chemistry guidelines. Currently, the VEGP Closed Cooling Water Program uses "*Closed Cooling Water Chemistry Guideline: Revision 1 to TR-107396, Closed Cooling Water Chemistry Guideline*, EPRI, Palo Alto, CA: 2004. 1007820." The VEGP Closed Cooling Water Program is updated as revisions to the EPRI guideline are released.

Enhancements to the VEGP Closed Cooling Water Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Closed Cooling Water Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.M21, "Closed-Cycle Cooling Water System," with exceptions and enhancements.

Exceptions to NUREG-1801

The VEGP Closed Cooling Water Program is consistent with the program described in NUREG-1801, Section XI.M21, "Closed-Cycle Cooling Water System," with the following exceptions.

Elements Affected	Exception
2. Preventive Actions	The VEGP program currently uses the 2004 version of the EPRI Closed Cooling Water Chemistry Guidelines (EPRI 1007820) and will be updated periodically to incorporate later closed cooling water guidance. (1)

Elements Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria	The VEGP program is based on EPRI 1007820, which does not include performance monitoring and functional testing. The VEGP program uses corrosion-monitoring techniques to manage component degradation that could impact a passive function. (2)

(1) The program described in NUREG-1801, Section XI.M21, is based on the 1997 version of the EPRI Closed Cooling Water Chemistry Guidelines, TR-107396. The VEGP program currently uses the 2004 version of the EPRI Closed Cooling Water Chemistry Guidelines and will be updated periodically to incorporate later closed cooling water guidance. This difference is considered to be an exception. This exception is acceptable because the EPRI Closed Cooling Water Chemistry guidelines are 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.

(2) The program described in NUREG-1801, Section XI.M21, describes performance testing and functional testing as performed in accordance with EPRI TR-107396. The VEGP program is based on EPRI 1007820, which does not include performance monitoring and functional testing as a key part of a closed cooling water program. EPRI 1007820 notes that performance testing is typically part of an engineering program. In most cases, functional and performance testing verify that component active functions can be accomplished and as such would be included as a part of Maintenance Rule (10 CFR 50.65). Therefore, performance monitoring and functional testing is not included as a part of the VEGP Closed Cooling Water Program. The VEGP program uses corrosion-monitoring (which includes component inspections) to monitor program effectiveness at managing component degradation that could impact a passive function.

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
3. Parameters Monitored/Inspected	The VEGP Closed Cooling Water Program Strategic Plan will be updated to indicate the components in each system that are most susceptible to various corrosion mechanisms and to ensure that corrosion monitoring is appropriately implemented.

Operating Experience

The VEGP Closed Cooling Water Program is based on EPRI guidelines. The EPRI guidelines have been developed based on plant experience, research data, and expert opinion. These guidelines are periodically updated and improved by the industry using a consensus process.

Issues related to VEGP CCW system chemistry control include identification of adverse conductivity to nitrite ratios due to oxidation of the nitrate corrosion inhibitor and identification of chemistry parameters above guideline limits. In these cases, the issue was identified before concentrations reached levels that are known to cause increased corrosion. Feed and bleed operations were used to return concentrations to acceptable values.

Regarding corrosion monitoring, trending of total iron and total copper has not identified any adverse trends or unexpected corrosion rates.

There have been a number of nitrite SCC related leaks associated with carbon steel components in the VEGP Unit 2 ACCW system. Metallurgical evaluation of a number of these leaks identified the root cause as stress corrosion cracking. To date, the failures have been limited to the Unit 2 ACCW system. Management of this specific aging mechanism is addressed by the ACCW Carbon Steel Components Program (Appendix B.3.1).

Reviews of condition reports indicated that degradation of the composite polymer (CeramAlloy) coatings in the EDG System Lube Oil Heat Exchangers is also occurring. The tubesheets of these heat exchangers are exposed to jacket water, which is nitrite treated closed-cycle cooling water. Identified degradation included minor blistering and flaking of the coating system. No significant deterioration of the underlying base metals was identified. VEGP is currently removing the CeramAlloy coatings. No license renewal credit is taken for the mitigating properties of applied coatings.

Conclusion

Continued implementation of the VEGP Closed Cooling Water Program provides reasonable assurance that the applicable aging effects will be managed during the period of extended operation.

B.3.7 DIESEL FUEL OIL PROGRAM

Program Description

The Diesel Fuel Oil Program is an existing plant-specific program that manages loss of material in the diesel fuel oil systems for the emergency diesel generators and diesel engine-driven fire water pumps through monitoring and maintenance of diesel fuel oil quality. The program is based on VEGP Technical Specification requirements and supplemental requirements.

Draining, cleaning, and internal condition inspections of diesel fuel oil components are implemented under other aging management programs as follows:

- The Periodic Surveillance and Preventive Maintenance Program (Appendix B.3.21) describes periodic cleaning and inspection the interior of the EDG System's diesel fuel oil storage tanks.
- Fire Protection Program (Appendix B.3.9) describes use of visual inspections of the fuel supply lines for the diesel engine-driven fire water pumps for leakage during diesel operation as a part of surveillance testing.
- The One-Time Inspection Program (Appendix B.3.17) describes inspections to verify the effectiveness of the Diesel Fuel Oil Program at preventing loss of material in the diesel fuel oil components by performing sampling inspections focused on locations where contaminants may accumulate, such as tank bottoms. The inspections include thickness measurements of storage tank bottom surfaces to verify that significant degradation is not occurring.

Program Scope

The Diesel Fuel Oil Program is credited for license renewal to manage loss of material due to corrosion on the surfaces exposed to diesel fuel oil in the following systems:

- Emergency Diesel Generator (EDG) System
- Fire Protection System (diesel engine-driven fire water pumps).

The program monitors and maintains diesel fuel oil quality in the diesel fuel oil systems for the emergency diesel generators and diesel engine-driven fire water pumps. For license renewal, the program focus is to manage conditions that can cause loss of material in system components by monitoring and maintaining diesel fuel oil quality in the storage tanks. Fuel oil monitoring activities intended to minimize the potential for degradation of the coating system on the interior of the EDG System's diesel fuel oil storage tanks are included in the scope of the program.

Preventive Actions

When determined to be applicable based on the results of microbe and stability analyses, biocides and fuel oil stabilizers are added.

Parameters Monitored or Inspected

Fuel Oil Addition

Prior to offloading fuel oil to the EDG diesel fuel oil storage tanks, fuel oil contained in tanker cars is bottom sampled. When the tanker contains multiple compartments, a composite sample having proportionate volumes from each compartment will be used. Bottom sampling of new fuel oil provides a conservative measure of fuel oil contaminants such as water and sedimentation.

Before addition of the fuel oil to the EDG diesel fuel oil storage tanks, the fuel oil is analyzed for the following parameters related to aging management:

- Clear and bright appearance in accordance with ASTM test method D4167,
- Mercaptan sulfur content in accordance with ASTM test methods D3227 or D484, and;
- Neutralization Number in accordance with ASTM test method D664.

Before addition to the diesel fuel oil tanks for the diesel engine-driven fire water pumps, or within 72 hours after fuel addition, the fuel oil is tested for a clear and bright appearance in accordance with ASTM test method D4167.

In accordance with plant Technical Specifications, samples collected prior to offload to the EDG diesel fuel oil storage tanks are analyzed for the parameters specified in Table 1 of ASTM D975 (1981) within 31 days after addition to the tanks. For aging management, the following parameters from this analysis are credited to manage the effects of aging:

- Water and sediment content consistent with ASTM test methods D1796 or D2709.
- Copper Strip Corrosion analyzed consistent with ASTM test method D130.

Stored Fuel Oil

Fuel oil stored in the EDG fuel oil storage tanks is monitored for the following parameters related to aging management:

- Check for and remove accumulated water,
- Using a recirculated tank sample, total particulate content consistent with ASTM test method D6217 (this method uses a 0.8 micron filter),
- Using a recirculated tank sample, Mercaptan sulfur content in accordance with ASTM test methods D3227 or D484,
- Using a recirculated tank sample, Neutralization Number in accordance with ASTM test method D664, and;
- Using a recirculated tank sample, microbe and stability analyses are performed.

Testing of fuel oil Mercaptan sulfur and Neutralization Number is performed to address the potential for aggressive conditions that could affect the coating applied to the internal surfaces of the EDG diesel fuel oil storage tanks.

The stored fuel oil in the diesel fuel oil tanks for the diesel engine-driven fire water pumps is analyzed for a clear and bright appearance using a composite sample from the storage tank.

Detection of Aging Effects

Degradation of fuel oil system components cannot occur without the presence of contaminants in the fuel oil such as water, sediment, or microbiological organisms. Degradation of the EDG fuel oil storage tanks interior coating system is minimized by monitoring Mercaptan sulfur and Neutralization Number as indications of the aggressiveness of the fuel oil. Periodic sampling, analysis, and appropriate corrective actions provide assurance that the presence of fuel oil contaminants is not adversely impacting fuel oil system components.

Loss of material in internal surfaces of fuel oil system components is detected through activities and inspections performed under other aging management programs. These inspection activities include visual and volumetric examinations techniques as described below:

- For the EDG diesel fuel oil storage tanks, the internal tank surfaces are visual inspected for degradation of the applied coating and corrosion of the tank base metal during the cleaning and visual inspection performed under the Periodic Surveillance and Preventive Maintenance Activities (Appendix B.3.21) .
- The fuel supply lines for the diesel engine-driven fire water pumps are visually monitored for leakage indicative of component degradation during diesel operation as a part of the surveillance testing performed under the Fire Protection Program (Appendix B.3.9).

- The One-Time Inspection Program (Appendix B.3.17) monitors the effectiveness of the Diesel Fuel Oil Program at preventing loss of material in the diesel fuel oil components by performing sampling inspections focused on locations where contaminants may accumulate, such as tank bottoms. The inspections will include thickness measurements of storage tank bottom surfaces to verify that significant degradation is not occurring.

Monitoring and Trending

EDG System stored fuel oil is monitored periodically as follows:

- Consistent with the plant Technical Specifications, accumulated water is checked for and removed every 31 days.
- Consistent with the plant Technical Specifications, total particulate is monitored every 31 days.
- Mercaptan sulfur and Neutralization Number are monitored quarterly.

Diesel engine-driven fire water pumps' stored diesel fuel oil is analyzed for a clear and bright appearance quarterly.

Acceptance Criteria

<u>New Fuel Oil</u>

EDG System new fuel oil acceptance criteria are as follows:

- New fuel oil must have a clear and bright appearance in accordance with ASTM test method D4167.
- Mercaptan sulfur content must be less than 0.01% if stored oil Mercaptan content is greater than 0.007% or the offload exceeds 15,000 gal added to the storage tank since the last Mercaptan analysis where Mercaptan content was less than 0.007%.
- Neutralization Number must be less than 0.2.
- Water and sediment content analyzed consistent with ASTM test methods D1796 must be less than 0.05%.
- Water and sediment content analyzed consistent with ASTM test methods D2709 must meet the pass the method criteria.
- Copper strip corrosion analyzed consistent with ASTM test method D130 must be No. 3 or less.
- Before addition to the diesel fuel oil storage tank for the diesel engine-driven fire water pumps, or within 72 hours after fuel oil addition, the fuel oil is tested for a clear and bright appearance in accordance with ASTM test method D4167.

Stored Fuel Oil

EDG System stored fuel oil acceptance criteria are as follows:

- Any indication of accumulated water is unacceptable.
- Total particulate must be less than 10 mg/liter;
- Mercaptan sulfur and content must be less than 0.01%.
- Neutralization Number must be less than 0.2.
- Microbe analyses must not indicate significant microbe content.
- Stability analyses must not indicate any significant breakdown of the fuel oil.

Stored fuel oil for the diesel engine-driven fire water pumps must have a clear and bright appearance.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Confirmation Process

This attribute is discussed in Appendix B.1.3.

Administrative Controls

This attribute is discussed in Appendix B.1.3.

Operating Experience

The VEGP Diesel Fuel Oil Program is implemented and maintained in accordance with the general requirements for environmental and engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements.

No significant degradation of EDG Fuel Oil System or Fire Pump Diesel Fuel Oil System components has been identified to date. During recent 10-year cleaning and inspection of the EDG Fuel Oil Storage Tanks, only minimal amounts of sludge were observed. No damage to the inorganic zinc coating or the underlying tank base metal was observed.

Review of recent VEGP operating experience did not identify any significant or repetitive problems related to diesel fuel oil test results. Only two minor test failures were identified. In 2002, a small quantity of water was detected and removed from the 1A Emergency Diesel Fuel Oil Storage Tank during a check for accumulated water. In 2003, high solids were detected in the number 5 Fire Pump Diesel Fuel Oil Storage Tank by a clear and bright test.

The tank contents were circulated through a portable filtration system. After filtration, the tank contents passed a follow-up clear and bright test.

The conditions of the fuel oil storage tanks and other components and the early detection of fuel oil quality issues by fuel oil sampling demonstrate that the program has been effective in managing degradation of the surfaces exposed to diesel fuel oil.

Enhancements

None

Conclusion

Continued implementation of the VEGP Diesel Fuel Oil Program provides reasonable assurance that the applicable aging effects will be managed during the period of extended operation.

B.3.8 EXTERNAL SURFACES MONITORING PROGRAM

Program Description

The VEGP External Surfaces Monitoring Program is a new program that inspects external surfaces of mechanical system components requiring aging management for license renewal in external air environments. Surfaces constructed from materials susceptible to aging in these environments are inspected at frequencies that assure the effects of aging are managed such that system components will perform their intended function during the period of extended operation.

The program detects corrosion, flange leakage, missing or damaged insulation, damaged coatings, and indications of fretting or wear. Inspections of insulated surfaces are performed on a sampling basis targeting areas identified by baseline inspections and operating experience as most susceptible. Accessible polymers and elastomers are inspected for age-related degradation, including cracking, peeling, blistering, chalking, crazing, delamination, flaking, discoloration, physical distortion, embrittlement (hardening), and gross softening.

Systems and components which are normally inaccessible and therefore not readily available for inspection are inspected when they are made accessible during outages, routine maintenance or repair, or they may be inspected by remote means (borescope, robotic camera, etc.).

External surfaces of buried system components are inspected under the Buried Piping and Tanks Inspection Program (Appendix B.3.4). Loss of material from external surfaces due to boric acid corrosion is evaluated by the Boric Acid Corrosion Control Program (Appendix B.3.3).

The VEGP External Surfaces Monitoring Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The External Surfaces Monitoring Program is a new program that will be consistent with the program described in NUREG-1801, Section XI.M36, “External Surfaces Monitoring,” with exceptions.

Exceptions to NUREG-1801

The External Surfaces Monitoring Program will be consistent with the program described in NUREG-1801, Section XI.M36, “External Surfaces Monitoring,” with the following exceptions.

Elements Affected	Exception
1. Program Scope 3. Parameters Monitored/Inspected	The VEGP program scope will include additional materials such as elastomers, aluminum, and copper. The GALL program is described as being applicable to steel components only.
1. Program Scope 4. Detection of Aging Effects 5. Monitoring and Trending	For areas that are inaccessible during both normal operations and refueling outages, the VEGP program will inspect the area when it is made accessible during maintenance or for other reasons. These areas may also be inspected by remote means (borescope, robotic camera, etc.).
4. Detection of Aging Effects 5. Monitoring and Trending	The VEGP External Surfaces Monitoring Program is not credited for managing loss of material from internal surfaces. This is conservatively treated as an exception to the GALL statement.

Elements Affected	Exception
1. Program Scope 2. Preventive Actions 3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria	The acceptance criteria in the program implementing procedures will not cite specific design codes or standards. This is considered an exception to GALL, which states: "Acceptance criteria include design standards, … , industry codes or standards, …and engineering evaluation." The scope of the VEGP External Surfaces Monitoring Program will include a wide range of systems covered by ASME Class 2, ASME Class 3, ANSI B.31.1, NFPA, AWWA, plumbing, and manufacturer's codes and standards in a variety of pipe and component sizes, therefore specific quantitative acceptance criteria (e.g., minimum pipe wall thickness) will not be included for practical considerations. The inspections will be focused on identifying qualitative indications of corrosion. The quantitative evaluation of deficient conditions, such as comparison of pipe wall thickness with code minimum allowable, will be performed as part of the corrective action process initiated when a Condition Report (CR) is written for a deficient condition.

Enhancements

None

Operating Experience

This is a new program, and therefore has no programmatic operating experience. However, the results of existing system monitoring and material condition reporting programs are relevant to this program. Visual inspection techniques are well proven in the industry and have been demonstrated as an effective means for detecting degradation. Corrosion of external surfaces has been reported in the course of performing various maintenance and surveillance activities. These existing activities have proven effective in maintaining the material condition of plant systems.

The VEGP program is based on the program described in NUREG-1801, which is based on industry operating experience. The VEGP plant-specific operating experience is not inconsistent with the operating experience described in the NUREG-1801 program.

Conclusion

Implementation of the new External Surfaces Monitoring Program will provide reasonable assurance that applicable aging effects will be adequately managed such that the intended functions of the applicable components will be maintained during the period of extended operation.

B.3.9 FIRE PROTECTION PROGRAM

Program Description

The VEGP Fire Protection Program is an existing program that includes inspections, performance testing, and condition monitoring of water and gas based fire protection systems, fire barriers, and fire pump diesels and their fuel oil supply components. The program is implemented through various plant procedures and will effectively manage fire protection components relied upon for 10 CFR 50.48 compliance such that the intended functions will be maintained through the period of extended operation.

The gas-based fire protection systems managed by the program include fixed Halon gaseous suppression systems. Fixed CO_2 gaseous suppression systems are not relied on at VEGP to meet the requirements of 10 CFR 50.48 and thus there are no fixed CO_2 fire suppression systems in the scope of license renewal.

The program manages water-based fire suppression systems that include sprinklers, nozzles, valves, hydrants, fittings, hose stations, standpipes, water storage tanks, and aboveground and underground piping components. The water-based systems are maintained at the normal operating pressure and any loss of system pressure is detected and remedied in a timely manner.

The water-based and gas-based fire suppression systems are tested and inspected in accordance with plant procedures based in part on the applicable National Fire Protection Association codes and standards. Periodic inspections, performance testing and system monitoring provide an effective means to assure functionality of these components.

The fire barrier inspections include periodic visual inspection of structural fire barriers, including fire walls, floors, ceilings, fire penetration seals, and fire doors.

Diesel driven fire pumps and fuel oil supply components are periodically inspected and tested to ensure that the diesels, pumps and fuel oil supply components can perform their intended functions.

Enhancements to the Fire Protection Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Fire Protection Program is consistent with the programs described in NUREG-1801, Sections XI.M26, “Fire Protection” and XI.M27, “Fire Water System,” with exceptions and enhancements.

Exceptions to NUREG-1801

The Fire Protection Program is consistent with the programs described in NUREG-1801, Sections XI.M26, “Fire Protection” and XI.M27, “Fire Water System,” with the following exception.

Elements Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	Performance testing of the fixed Halon fire suppression system is performed at 18 month intervals rather than at least once every 6 months as specified by NUREG-1801, Section XI.M26. (Note: visual inspections of the Halon system are performed at 6 month intervals.)

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
3. Parameters Monitored/Inspected 4. Detection of Aging Effects	The VEGP Fire Protection Program will be enhanced to perform wall thickness evaluations on water suppression piping systems using non-intrusive volumetric testing or visual inspections to ensure that wall thicknesses are within acceptable limits, as specified by NUREG-1808, Section XI.M27.. Initial wall thickness evaluations will be performed before the end of the current operating term. Subsequent evaluations are performed at plant specific intervals during the period of extended operation. The plant specific inspection intervals will be determined based on evaluation of previous evaluations and site operating experience.

Elements Affected	Enhancement
4. Detection of Aging Effects	The VEGP Fire Protection Program will be enhanced to inspect a sample of sprinkler heads using the guidance of NFPA 25 "Inspection, Testing and Maintenance of Water-Based Fire Protection Systems" (1998 Edition), Section 2-3.1.1, or NFPA 25 (2002 Edition), Section 5.3.1.1.1, as specified by NUREG-1801, Section XI.M27. Where sprinkler heads have been in place for 50 years, they will be replaced or representative samples from one or more sample areas will be submitted to a recognized testing laboratory for field service testing. This sampling is performed every 10 years after the initial field service testing. The 50 years of time in service begins when the system was placed in service, not when the plant became operational.
1. Scope of Program 3. Parameters Monitored/Inspected 4. Detection of aging effects 5. Monitoring and Trending 6. Acceptance Criteria	The VEGP Fire Protection Program will be enhanced to provide more detailed instructions for visual inspection of Fire Pump Diesel fuel supply lines for leakage, corrosion, and general degradation while the engine is running during fire suppression system pump tests as specified by NUREG-1801, Section XI.M26.

Operating Experience

Operating history shows that the Fire Protection Program has been effective in ensuring the continued ability of fire protection systems to protect safe shutdown capability at VEGP and to prevent radioactive releases as the result of a fire at VEGP. Internal and external assessments have been effective in identifying programmatic strengths and weaknesses and prompting corrective actions.

There have been some age-related degradation issues associated with VEGP fire protection systems and features. Fire water pump casings have experienced some loss of material due to corrosion; one pump has been replaced and the long range plan is to replace the rest. Corrosion was observed in the fire water storage tanks and tank coating degradation was also noted; long range plans are to replace the coating. Minimal amounts of leakage and corrosion were observed in carbon steel fire protection piping components and corrective actions were taken. Pinhole leaks were discovered in underground cast iron fire protection piping headers and corrected. In some cases, fire penetration seals have experienced shrinkage and degradation that required repairs. There was no loss of intended function as a result of these events.

No age-related failures were identified for the VEGP fixed Halon fire suppression systems.

Other failures were identified that were attributed to design, installation, or operational issues, and not age-related. Leaking mechanical joints have occurred in underground cast iron piping. This is a typical problem with bell and spigot joints in buried fire protection piping due to system transient loadings and adequacy of restraint. A fire protection header line broke due to a water hammer event. Some sprinkler system brass valves were determined to be under-designed and were replaced with heavier duty valves as a result of vibration related cracks.

Conclusion

The existing Fire Protection Program at VEGP has been effective in identifying and correcting degradation of fire protection system components before loss of intended function. Continued implementation of the Fire Protection Program, with enhancements as described above, provides reasonable assurance that the aging effects will be managed such that the components in the scope of License Renewal will continue to perform their intended function(s) during the period of extended operation.

B.3.10 FLOW-ACCELERATED CORROSION PROGRAM

Program Description

The VEGP Flow-Accelerated Corrosion (FAC) Program is an existing program that manages loss of material (wall thinning) due to FAC in susceptible plant piping and other components. The Flow-Accelerated Corrosion Program is based on the guidance of NSAC-202L-R2, “Recommendations for an Effective Flow-Accelerated Corrosion Program” including subsequent revisions. The program includes analysis to determine susceptible locations, predictive modeling techniques, baseline inspections of wall thickness, follow-up inspections, and repair or replacement of degraded components as necessary. The program is currently being updated to reflect NSAC-202L-R3.

VEGP has elected to replace some carbon steel piping and piping components with FAC-resistant chrome-molybdenum alloy steel. Although the alloy steel has increased resistance to FAC, the alloy steel components remain in the scope of the FAC Program. SNC’s aging management review process defines carbon steel to include low alloy steel piping used as replacement materials in FAC-susceptible lines. Since the low alloy steel is more resistant to FAC than carbon steel, the aging effects of the low alloy steel are bounded by the carbon steel. This results in a conservative aging management approach.

VEGP also uses the FAC Program and its inspection techniques to manage wall thinning that is occurring in piping components downstream of the steam generator blowdown demineralizers that is not attributed to FAC. The wall thinning has been attributed to the acidic conditions of the demineralizer effluent. The environment is low temperature and low pressure, so FAC has been eliminated as a cause for this thinning.

The program provides for inspections and monitoring of the extent of wall thinning and initiation of corrective actions to replace affected components prior to loss of intended function.

NUREG-1801 Consistency

The VEGP Flow-Accelerated Corrosion Program is consistent with the program described in NUREG-1801, Section XI.M17, “Flow-Accelerated Corrosion,” with exceptions.

Exceptions to NUREG-1801

The Flow-Accelerated Corrosion Program will be consistent with the program described in NUREG-1801, Section XI.M17, "Flow-Accelerated Corrosion," with the following exceptions.

Elements Affected	Exception
1. Program Scope	The NUREG-1801 program discussion includes steam generator feedwater and steam outlet nozzle safe ends. The VEGP steam generator feedwater nozzles and steam outlet nozzles do not have safe ends. In addition, the VEGP steam outlet nozzles are not considered to be FAC susceptible based on steam quality.
1. Program Scope 4. Detection of Aging Effects	SNC continuously improves the program through updates to reflect industry operating experience and guidance document revisions. NUREG-1801, Volume 2, Section XI.M17, cites NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program," as the accepted source document for development of a FAC Program. EPRI Report 1011838 (NSAC-202L-R3) has been issued, which supersedes all prior versions of NSAC-202L. SNC is updating the FAC Program to reflect the recommendations of EPRI Report 1011838 (NSAC-202L-R3). The revised NSAC-202L contains recommendations updated with the experience of members of the CHECWORKS™ Users Group, plus recent advances in detection, modeling, and mitigation technology. These recommendations are intended to refine and enhance those of earlier versions, without contradiction, so as to ensure the continuity of existing plant FAC programs. The differences between revisions 2 and 3 of this report have been evaluated and are being incorporated into the implementing procedures governing the FAC Program.

Elements Affected	Exception
1. Program Scope	The GALL program implies that all systems constructed of carbon steel and containing any high-energy fluid (two phase as well as single phase) are within the scope of the FAC program. The VEGP FAC Program takes exception to the environments which are prone to FAC as implied by the GALL Scope statement. The VEGP FAC Program excludes any systems that do not transport water or steam. Systems that transport superheated or "dry" steam are also excluded from the VEGP FAC Program. This is consistent with the guidance provided in EPRI Report 1011838 (NSAC-202L-R3), Section 4.2.1, Potential Susceptible Systems.
1. Program Scope	The GALL program explicitly limits the materials subject to FAC inspections to carbon steel. The VEGP FAC Program includes an exception to the GALL program scope by including low alloy steel with a chromium content of less than 1.25% as being susceptible to FAC. This is consistent with the guidance provided in EPRI Report 1011838 (NSAC-202L-R3), Section 4.2.2, Exclusion of Systems from Evaluation.
1. Program Scope	The VEGP FAC Program will encompass wall thinning resulting from FAC and can also be used to manage similar phenomena such as cavitation, impingement, and erosion, for piping or components whose failure could result in personnel injuries or detrimental operation effects in systems determined to be susceptible to FAC. The GALL Program does not consider use of the FAC Program to monitor wall thinning from mechanisms other than FAC.

Elements Affected	Exception
4. Detection of Aging Effects	The VEGP FAC Program includes inspection methodology that is considered an exception to the GALL program. In addition to UT and RT, the VEGP FAC Program permits the use of other industry-accepted inspection techniques where practical. In certain large-bore systems, visual inspection (VT) of the piping inner surfaces may be performed. Visual inspections provide immediate indications of FAC. Follow-up UT may be used to confirm or to quantify visual inspection results. This is consistent with the guidance provided in EPRI Report 1011838 (NSAC-202L-R3).
6. Acceptance Criteria	The VEGP FAC Program includes pipelines or components that cannot be accurately modeled due to widely varying or unknown operating conditions, or other reasons. The GALL program does not address pipelines or components that cannot be modeled. The inspection results for these unmodeled pipelines or components are evaluated by engineering judgment. This is consistent with the guidance provided in EPRI Report 1011838 (NSAC-202L-R3).

Enhancements

None

Operating Experience

The effectiveness of the FAC Program at VEGP is demonstrated by the program results, which are consistent with industry experience. Wall thickness inspections have been performed since 1991, and numerous components and piping segments have been replaced in susceptible systems, including a total in excess of 3100 ft of susceptible small-bore pipe which has been replaced with FAC resistant materials. While the program continues to identify areas of pipe wall thinning, there have been no leaks in large-bore piping on either unit attributed to FAC since 1992. A small number of leaks from small-bore piping (which is not modeled by CHECWORKS™) continue to be identified. However, the frequency of leaks has dropped significantly as piping replacement has progressed.

VEGP has experienced chemical wastage of piping components downstream of the SGBD demineralizers. The pipe wall thinning is believed to be due to acidic conditions of the demineralizer effluent. As the blowdown passes through the demineralizers ammonia is stripped out. The resulting effluent is acidic in nature. Oxygen is also introduced into the blowdown effluent via an inability to completely vent the demineralizer vessels, resulting in higher oxidation rates. The environment is low temperature and low pressure, so flow accelerated corrosion has been eliminated as a cause for this thinning. VEGP uses FAC Program inspection techniques to manage this aging effect.

Conclusion

The overall operating history of the VEGP FAC Program, coupled with the enhanced program scope, provides reasonable assurance that loss of material due to FAC will be managed such that the FAC susceptible components within the scope of license renewal will continue to perform their intended functions during the period of extended operation.

B.3.11 FLUX THIMBLE TUBE INSPECTION PROGRAM

Program Description

The VEGP Flux Thimble Tube Inspection Program is an existing program that manages loss of material due to fretting/wear of the incore flux detector thimble tubes. The program implements the VEGP response to NRC Bulletin No. 88-09, "Thimble Tube Thinning in Westinghouse Reactors." The program uses proven non-destructive examination techniques to monitor for wear of the flux thimble tubes. The test results are evaluated to determine the wear rate using proprietary methodology which includes applying an allowance for uncertainty to the measured wear data. The wear rate predictions are then compared against the acceptance criteria to determine the need for corrective actions such as repositioning, capping, or replacement of a flux thimble tube. The wear rate predictions are also used to establish the interval to the next inspection.

The Flux Thimble Tube Inspection Program will be enhanced prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Flux Thimble Tube Inspection Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.M37, "Flux Thimble Tube Inspection," with an enhancement.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
Program Description	A VEGP program procedure will be issued documenting the Flux Thimble Tube Inspection Program administration and implementing activities credited for license renewal.

Operating Experience

No through-wall leaks of flux thimble tubes have been observed at VEGP. However, wear has exceeded the acceptance criteria in several flux thimble tubes resulting in corrective measures. Some tubes have been repositioned to introduce new wear surfaces. Other thimble tubes have been capped.

The evaluation of the latest eddy current test data for Unit 1, which was performed during the Unit 1 twelfth refueling outage (Spring 2005), indicated that the in-service flux thimble tubes would be satisfactory for continued operation through the fourteenth refueling outage. The evaluation also indicated that two flux thimble tubes would be within 1% of the VEGP administrative acceptance criteria limit of 70% through-wall wear if they remained in operation through the fourteenth refueling outage.

The evaluation of the latest eddy current test data for Unit 2, which was performed during the Unit 2 twelfth refueling outage (Spring 2007), indicated that the in-service flux thimble tubes would be satisfactory for continued operation through the fourteenth refueling outage. This evaluation concluded the in-service flux thimble tubes are not expected to approach the acceptance criteria limit through the fourteenth refueling outage.

Conclusion

The VEGP Flux Thimble Tube Inspection Program is an established program with a proven history of managing wear in the flux thimble tubes. This program provides reasonable assurance that the intended function of the flux thimble tubes will be maintained through the period of extended operation.

B.3.12 GENERIC LETTER 89-13 PROGRAM

Program Description

The VEGP Generic Letter 89-13 Program is an existing program that relies on the activities which implement the VEGP response to the NRC recommended actions contained in Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment." The Generic Letter 89-13 Program activities include mitigation, as well as performance and condition monitoring techniques to ensure that the effects of aging on the Nuclear Service Cooling Water System (NSCW), and on those components supplied by the NSCW system will be managed.

Prevention or mitigation of fouling and loss of material in the NSCW System and NSCW supplied components is accomplished, in part, by intermittent injection of appropriate water treatment chemicals. Other preventive and monitoring aspects of the VEGP Generic Letter 89-13 Program include periodic flushing of lines to mitigate or prevent fouling, periodic measurement of flow rates through selected components, periodic analysis of corrosion coupons, and cleaning of selected heat exchangers at regular intervals. Some components are visually inspected for fouling or loss of material. Volumetric examination may be used to detect degradation.

Enhancements to the Generic Letter 89-13 Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Generic Letter 89-13 Program is consistent with program described in NUREG-1801, Section XI.M20, "Open-Cycle Cooling Water System," with an exception and enhancements.

Exceptions to NUREG-1801

The Generic Letter 89-13 Program is consistent with the program described in NUREG-1801, Section XI.M20, “Open-Cycle Cooling Water System,” with the following exception.

Elements Affected	Exception
5. Monitoring and Trending	The VEGP Generic Letter 89-13 Program activities are performed at a variety of intervals depending on the component, the parameter being monitored, and results of previous inspections. NUREG-1801 states that testing and inspections are done annually and during refueling outages. The Generic Letter 89-13 Program activities are performed at intervals consistent with the VEGP commitments made in response to GL 89-13. Inspection intervals range from monthly for some flow measurements to ten years for NSCW Pump removal and refurbishment.

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
Program Description	An overall program procedure will be prepared which describes the various program activities that comprise Generic Letter 89-13 Program and their implementing controls such as chemistry procedures, maintenance activities, scheduled surveillances, or other mechanisms.
3. Parameters Monitored/Inspected	The VEGP Generic Letter 89-13 Program activities will be enhanced to include: • Inspection of the NSCW Transfer Pumps’ casings and bolting. • Inspection of the NSCW Cooling Tower spray nozzles as a specific item to be inspected during cooling tower inspections.

Operating Experience

An inspection program for safety-related heat exchangers was implemented in response to the concerns raised in GL 89-13, beginning with the Fall 1990 refueling outage on Unit 2. The results of the inspections typically indicated traces of silt. A small number of those early inspections found minor amounts of debris in some heat exchangers. In 1993 the heat exchanger inspection frequency was extended due to the favorable results.

Beginning in 1993, various inspections found debris sufficient to block tubes in several heat exchangers. In addition, investigation of a high CCW motor winding temperature revealed that the motor cooler's NSCW supply flow orifice was blocked by debris. Blockage was also identified in the NSCW supply to an NSCW pump motor cooler. Due to the repeated instances of fouling of NSCW components, in October 1995 the NRC issued Unresolved Item (URI) 424, 425/95-12-04. In December 1995, the URI was closed and the NRC opened Level 4 Violation 424, 425/95-27-04.

To address the flow blockage issues, starting in 1995 periodic flow measurements were instituted for small diameter flow orifices, several modifications were implemented to prevent debris from entering the NSCW cooling towers, the cooling tower basins were inspected and cleaned by diving services, and an expanded inspection scope was performed during the 1996 refueling outage on each unit. Furthermore, analysis of the debris indicated that some debris was the result of Colmonoy coating flaking off of NSCW pump sleeves and wear rings. The NSCW Pumps were refurbished to eliminate this coating as a source of debris.

The more aggressive monitoring and inspection program implemented in response to the flow blockage issues has been effective in identifying fouling of flow orifices and heat exchangers prior to loss of function, for example, measured NSCW flows outside of the "expected" range but within the "acceptable" range, and accumulation of minor amounts of debris that do not affect heat exchanger performance.

Loss of material resulting in leaks at the containment cooler tube to header connections has occurred. The long range plan for containment coolers recommended replacing the cooling coils with stainless steel tubing material, and replacing the header design with a waterbox type design. Three Unit 2 coils and one Unit 1 coil have been replaced as of Fall 2006.

Scale material (calcium and silica) from the well water makeup system has been observed on the spray ring header of the NSCW towers. As a result, VEGP monitors the Ryznars Stability Index (RSI) which gives indication of conditions leading to the formation of scale. Blowdown is used to maintain RSI within limits.

Conclusion

Continued implementation of the existing Generic Letter 89-13 Program, with enhancements as described above, will provide reasonable assurance that the aging effects will be managed such that the components in the scope of License Renewal will continue to perform their intended function(s) during the period of extended operation.

B.3.13 INSERVICE INSPECTION (ISI) PROGRAM

The VEGP Inservice Inspection (ISI) Program is an existing plant-specific program that manages cracking, loss of material, loss of preload, and loss of fracture toughness in components crediting the program. The program uses periodic visual, surface, and volumetric examination and leakage tests of Class 1, 2 and 3 pressure-retaining components, their integral attachments, and supports to detect and characterize flaws.

The program is implemented in accordance with 10 CFR 50.55(a), which imposes inservice inspection requirements of ASME Section XI for Class 1, 2 and 3 pressure-retaining components, their integral attachments, and supports. Inspection, repair and replacement of these components are covered in Subsections IWB, IWC, IWD and IWF, respectively.

In conformance with 10 CFR 50.55a(g)(4)(ii) and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP ISI Program is updated at the end of each 120 month inspection interval to the latest edition and addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval. The VEGP Inservice Inspection Program 2nd inspection interval ended in May 2007. The VEGP 3rd inservice inspection interval requirements are based on ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda.

Program Scope

The following ASME Section XI inspection categories are credited for VEGP license renewal:

- All VEGP applicable IWB examination categories with the exception of categories B-N-1 and B-N-2. The Reactor Internals Program (Appendix B.3.24) is credited to manage aging of the reactor internals.
- IWC examination categories applicable to the VEGP Model F steam generators.
- IWC and IWD visual examinations credited as a part of the ACCW System Carbon Steel Components Program (Appendix B.3.1), Bolting Integrity Program (Appendix B.3.2) Boric Acid Corrosion Control Program (Appendix B.3.3), and External Surfaces Monitoring Program (Appendix B.3.8).
- All VEGP applicable IWF examination categories for component supports and associated bolting, including high strength NSSS component support bolting.

Preventive Actions

The ISI Program is a condition monitoring program that does not include preventive actions.

Parameters Monitored or Inspected

The ISI Program detects cracking, loss of material, loss of preload, and loss of fracture toughness in components crediting the program using inspection techniques specified in ASME Section XI, Subsections IWB, IWC, IWD, and IWF as implemented by the VEGP ISI Program. Loss of fracture toughness is limited to cast austenitic stainless steel valve bodies and pump casings operating at temperatures equal to or greater than 482 °F.

Detection of Aging Effects

The ISI program uses nondestructive examination (NDE) techniques as specified in ASME Section XI, Subsections IWB, IWC, IWD, and IWF to detect and characterize component flaws.

Volumetric examinations such as radiographic, ultrasonic or eddy current examinations are used to detect and characterize surface and subsurface flaws. Applicable examinations are in compliance with the performance demonstration initiative. This initiative program is currently based on Appendix VIII, 2001 edition of Section XI, as mandated by 10 CFR 50.55a.

Surface examinations, such as magnetic particle or dye penetrant testing, are used to detect surface flaws.

Three levels of visual examinations are specified. VT-1 visual examination is used to identify cracks and symptoms of wear, corrosion, erosion or physical damage on the surface of the component being examined. VT-1 can be performed using either direct visual observation or remote examination using various optical and video devices. VT-2 visual examination is used to locate evidence of leakage from pressure retaining components. VT-3 visual examination is used to determine general mechanical and structural condition of components and supports and to detect discontinuities and imperfections.

Monitoring and Trending

ISI Program inspection frequencies are established for each inspection interval consistent with ASME Section XI, as specified in 10 CFR 50.55a(g)(4)(ii). Currently, the VEGP ISI Program is based on ASME Inservice Inspection Program B (IWA-2432).

Results are compared, as appropriate, to baseline data and other previous test results. Indications are evaluated in accordance with ASME Section XI. If the component is qualified by analytical evaluation as acceptable for continued service, the area containing the indication is reexamined during subsequent inspection periods. Indications that exceed the acceptance standards are extended to include additional examinations in accordance with ASME Section XI.

ISI Program results are recorded every operating cycle and provided to the NRC every period via Owner's Activity Reports.

Acceptance Criteria

A pre-service, or baseline, inspection of program components was performed prior to startup to assure absence of defects greater than code-allowable. This baseline data also provide a basis for evaluating subsequent inservice inspection results. Results of inservice inspections are compared, as appropriate, to baseline data, other previous test results, and ASME Section XI acceptance standards.

ISI Program acceptance standards are defined in ASME Section XI Articles IWA-3000, IWB-3000, IWC-3000, IWD-3000, and IWF-3000, as applicable.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

If a flaw is discovered during ISI examination, evaluation is conducted in accordance with ASME Section XI Articles IWA-3000 and IWB-3000, IWC-3000, IWD-3000 or IWF-3000, as appropriate. If flaws exceed code acceptance standards, such flaws are removed, repaired, or the component is replaced prior to return to service.

For Class 1, 2 and 3 components, repair and replacement is in conformance with IWA-4000.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3.

Operating Experience

Because the ASME Code is a consensus document that has been widely used over a long period, it has been shown to be generally effective in managing aging effects in Class 1, 2 and 3 components and their integral attachments. Some specific examples of industry operating experience of component degradation are included in NUREG-1801.

The VEGP ISI Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews are performed.

Review of recent VEGP ISI Program performance results show that the program has been effective in finding and correcting degradation attributable to aging effects. Issues identified by the ISI Program have been associated with leakage at mechanical connections and surface corrosion. These minor conditions were either corrected or dispositioned as acceptable for continued service.

Inservice Inspection Program examinations identified wall loss in the Unit 2 stainless steel CVCS letdown piping between the flow orifices and their respective isolation valves. The pipe thinning mechanism was determined to be cavitation-induced erosion. Piping replacement and design modifications were implemented to correct the problem.

Enhancements

None

Conclusion

Continued implementation of the VEGP Inservice Inspection Program provides reasonable assurance that the aging effects will be managed such that the systems and components crediting the program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.14 NICKEL ALLOY MANAGEMENT PROGRAM FOR NON-REACTOR VESSEL CLOSURE HEAD PENETRATION LOCATIONS

The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations is a plant-specific program that will manage cracking due to primary water stress corrosion cracking (PWSCC) for non-reactor vessel head nickel alloy component locations. The overall goal of the program is to maintain plant safety and minimize the impact of PWSCC on plant availability through assessment, inspection, mitigation, and repair or replacement of susceptible components. Program development is based on MRP-126, “Generic Guidance for Alloy 600 Management.”

For the non-reactor vessel closure head penetration locations in PWR reactor coolant systems, PWSCC of Alloy 600 base material and Alloy 82 / 182 weld materials is a currently emerging materials degradation issue. The VEGP Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations is a plant-specific program which is being developed to address these concerns regarding the potential for primary water stress corrosion cracking in nickel alloy components exposed to a high temperature reactor coolant environment. While elements of this program are existing, implementation details are still under development by the industry. Consequently, this program has been categorized as a new program for license renewal.

The program is based on the following set of implementation commitments:

1) SNC will continue to participate in industry initiatives directed at resolving PWSCC issues, such as owners group programs and the EPRI Materials Reliability Program.

2) SNC will comply with applicable NRC Orders.

3) SNC will submit a program inspection plan for VEGP that includes implementation of applicable NRC Bulletins, Generic Letters, and staff accepted industry guidance. The inspection plan will be submitted to the staff for review and approval not less than 24 months prior to entering the period of extended operation for VEGP Units 1 and 2.

The program implementation commitments are consistent with the aging management program commitments listed in NUREG-1801, Rev. 1, Vol.2, Section IV for managing PWSCC for non-reactor vessel head nickel alloy components.

Currently, management of PWSCC in nickel alloys is a rapidly evolving area and as a result, program attributes have not yet been finalized. Further, where industry guidance has been developed, there are ongoing efforts to reach acceptable resolution of NRC staff concerns which may alter program requirements. Therefore, assessments for each of the ten aging management program elements are not included for this program.

The Nickel Alloy Management Program for Non-Reactor Vessel Closure Head Penetration Locations will manage cracking due to PWSCC for the following nickel alloy component locations:

- Butt welds within the primary system including:
  - Reactor Vessel Inlet and Outlet Nozzle Dissimilar Metal Welds
  - Pressurizer Surge, Spray, Safety, and Relief Nozzle Dissimilar Metal Welds
- Reactor Vessel Bottom Mounted Instrument Nozzles
- Reactor Vessel Flange Leakage Monitor Tube
- Steam Generator Primary Channel Head Drain Connection Tube & Dissimilar Metal Welds

Operating Experience

Within the industry, Alloy 600 / 82 / 182 locations experiencing PWSCC include vessel head CRDM penetrations, bottom mounted instrument penetrations, butt weld locations, steam generator drain connections, and pressurizer penetrations. The most recent industry experience relates to detection of indications in pressurizer nozzle butt welds at a number of PWRs.

At VEGP, PWSCC has not been detected at any Alloy 600 / 82 / 182 location to date. However, there is no reason to conclude that VEGP Alloy 600 / 82 / 182 locations will not experience PWSCC based on similarities with other units where PWSCC has been detected. Recent inspection history for VEGP Units 1 and 2 is summarized below.

<u>VEGP Pressurizer Butt Welds</u>

For the VEGP Unit 1 pressurizer butt weld locations, only the spray nozzle Alloy 82 butt weld has been volumetrically examined with a performance demonstration initiative qualified ultrasonic inspection technique. This examination was performed during the Spring 2005 refueling outage, with no recordable indications identified. Bare metal visual examinations have been performed on all Unit 1 Alloy 82 butt welds during both the Spring 2005 and Fall 2006 refueling outages, with acceptable results. Mitigation of the Unit 1 Alloy 82 butt welds by application of full structural weld overlays using Alloy 52 / 152 materials is scheduled to be performed during the Spring 2008 refueling outage.

Due to geometric limitations on inspection coverage and heightened concerns regarding the potential for PWSCC at pressurizer nozzle butt weld locations, all VEGP Unit 2 pressurizer butt weld locations were mitigated in the Spring 2007 refueling outage by application of full structural weld overlays using Alloy 52 / 152 weld material. Due to the structural replacement of the original Alloy 82 / 182 welds, prior inspection results are no longer meaningful.

VEGP Reactor Vessel Nozzle Butt Welds

During the Fall 2006 refueling outage for Unit 1 and the Spring 2007 refueling outage for Unit 2, all eight reactor vessel nozzle butt welds were volumetrically examined using a performance demonstration initiative qualified ultrasonic inspection technique, with no recordable indications identified. Additionally, bare metal visual examination did not identify any indication of leakage.

Reactor Vessel Bottom Mounted Instrumentation Penetrations

Bare metal visual examination of the bottom head area was performed for Unit 1 during the Fall 2006 refueling outage and for Unit 2 during the Spring 2007 refueling outage with no indications of leakage identified.

As a supplemental measure VEGP conducted volumetric examinations of Unit 1 and Unit 2 bottom mounted instrument penetrations during the Fall 2006 Unit 1 refueling outage and the Spring 2007 Unit 2 refueling outage. The inspection used ultrasonic and eddy current methods capable of detecting cracking of base material. Fifty-seven of fifty-eight Unit 1 penetrations were successfully examined and forty-six of fifty-eight Unit 2 penetrations were successfully examined. There were no recordable indications identified for any bottom mounted instrument penetration.

Steam Generator Primary Channel Head Drain Connection Tube & Dissimilar Metal Weld

For the steam generator primary channel head drains, a select number of plants having a design similar to that used in the VEGP Model F steam generators have experienced leaks due to PWSCC. The leaks were detected through visual identification of boric acid crystals around the drain line coupling. Detailed analysis indicated that the cracks initiated at the backside of the partial penetration weld, which is exposed to reactor coolant. To date, bare metal visual and VT-2 examination of the VEGP drain locations has not identified any cracking. Bare metal visual examination and VT-2 examination will be performed at each refueling outage until the location is mitigated.

Conclusion

The Nickel Alloy Management Program for Non-Reactor Vessel Head Penetration Locations will provide reasonable assurance that cracking of nickel alloy components due to PWSCC will be adequately managed such the components included within the scope of this program will continue to perform their intended function during the period of extended operation.

B.3.15 NICKEL ALLOY MANAGEMENT PROGRAM FOR REACTOR VESSEL CLOSURE HEAD PENETRATIONS

Program Description

The Nickel Alloy Management Program for RPV Closure Head Penetrations is an existing program that was developed to address industry concerns regarding the potential for primary water stress corrosion cracking (PWSCC) in nickel alloy components exposed to the reactor coolant environment. The program is based upon the requirements of NRC First Revised Order EA-03-009, which establishes requirements for susceptibility ranking and inspections.

Susceptibility ranking is based on calculated effective degradation years and the results of previous inspection findings. Inspection frequencies are determined by the susceptibility category.

Detection of cracking is accomplished through a combination of bare metal visual examinations and non-visual techniques. Bare metal visual examination is performed for 100% of each reactor vessel head surface, including 360º around each reactor vessel head penetration nozzle. Non-visual techniques require either (1) ultrasonic testing of each reactor vessel head penetration nozzle (i.e., nozzle base metal) from two inches above the J-Groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, or (2) Eddy current testing or dye penetrant testing of the wetted surface of each J-Groove weld and reactor vessel head penetration base metal to at least two inches above the J-Groove weld. Additionally, general visual inspection is performed at each refueling outage to identify potential borated water leaks from pressure retaining components above the reactor vessel head.

The current VEGP program includes one relaxation and one alternative from NRC First Revised Order EA-03-009 inspection requirements. These deviations from First Revised Order EA-03-009 requirements are not considered to be exceptions to the program described in NUREG-1801, Rev. 1, Section XI.M11A because they were approved by the staff (consistent with Section IV.F of the Order).

(1) Order EA-03-009, Section IV.C(5)(a), specifies examination coverage for bare metal visual examination of the reactor vessel head surface. Full examination coverage is not possible without removal of reflective metal insulation. A minimum additional dose of 10 rem is expected to inspect the less than one percent of the vessel head surface obscured by the insulation. The obscured area is in an area where leakage is not expected to initiate. SNC requested relaxation from the staff to not inspect the small surface of the reactor vessel head obscured by insulation. This relaxation was granted by the staff in a September 2005 Safety Evaluation (ML052300617).

(2) Order EA-03-009, Section IV.C(5)(b), specifies examination volume for reactor vessel head penetration nozzle base material. Full examination volume coverage using ultrasonic testing is not possible at VEGP due to geometry considerations. Specifically, the bottom end of the nozzles are threaded, internally tapered, or both. This geometry makes ultrasonic inspection in accordance with NRC First Revised Order EA-03-009 a hardship based on the need to consider the increased radiation dose due to implementation of surface examination options. SNC proposed to the staff to ultrasonically test nozzle ends to the maximum extent possible. This alternate approach was approved by the staff in an August 2006 Safety Evaluation (ML062360585).

The program will implement commitments for reactor vessel closure head penetrations associated with nickel alloys from (1) NRC Orders, Bulletins, and Generic Letters, and (2) staff-accepted industry guidelines.

NUREG-1801 Consistency

The VEGP Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations is an existing program which is consistent with the program described in 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

To date, the VEGP Unit 1 and 2 reactor vessel heads remain in the "Low" susceptibility category and require bare metal visual examination every third refueling outage or every five years (whichever comes first) and non-visual examination every fourth refueling outage or every seven years (whichever comes first).

The most recent inspection of the Unit 1 reactor vessel head was performed in the Fall of 2006. Non-visual examination did not identify degradation in any of the 78 CRDM penetrations examined, nor the reactor vessel head vent penetration. General visual inspection performed at the same time identified boron residue on one of four conoseal assemblies. The areas below the conoseals were cleaned and re-inspected. No degradation was identified.

The most recent inspection of the Unit 2 reactor vessel head was performed in the Spring of 2007. Non-visual examination did not identify degradation in any of the 78 CRDM penetrations examined, nor the reactor vessel head vent penetration. General visual inspection performed at the same time did not identify any indications of leakage.

The VEGP Nickel Alloy Management Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews are performed.

Conclusion

Continued implementation of the Nickel Alloy Management Program for Reactor Vessel Closure Head Penetrations provides reasonable assurance that PWSCC in the reactor vessel head penetrations will be managed such that these components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.16 OIL ANALYSIS PROGRAM

Program Description

The VEGP Oil Analysis Program is an existing program that ensures that the lubricating oil and hydraulic fluid environments in the in-scope mechanical systems are maintained to the required quality. The Oil Analysis Program maintains lubricating oil and hydraulic fluid system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to deleterious aging effects. Program activities include sampling and analysis of lubricating oil and hydraulic fluid for detrimental contaminants.

The One-Time Inspection Program includes inspections planned to verify the effectiveness of the Oil Analysis Program.

Enhancements to the Oil Analysis Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Oil Analysis Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.M39, “Lubricating Oil Analysis Program,” with an exception and enhancements.

Exceptions to NUREG-1801

The Oil Analysis Program is consistent with the program described in NUREG-1801, Section XI.M39, “Lubricating Oil Analysis Program,” with the following exception.

Elements Affected	Exception
Program Description 1. Program Scope 2. Preventive Actions 3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria 10. Operating Experience	The VEGP Oil Analysis Program includes hydraulic fluid in addition to lubricating oil. In accordance with manufacturer recommendations and good engineering practice, hydraulic fluid is sampled for particulates, water content, viscosity, and neutralization number. Since the hydraulic fluids in use at VEGP are inherently fire-resistant, flash point is not an appropriate analysis and is not performed for hydraulic fluid. The standards and acceptance criteria used for hydraulic fluid are in accordance with manufacturer’s recommendations.

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
Program Description 3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria 10. Operating Experience	An overall program procedure or guideline formalizing the sampling and analysis activities performed by this program will be issued.
3. Parameters Monitored/Inspected	For the components in the scope of license renewal determination of the viscosity, neutralization number and flash point of lubricating oil samples will be required for components where the oil is changed based on its analyzed condition instead of being changed on a regular schedule regardless of condition.
3. Parameters Monitored/Inspected	Analytical ferrography or elemental analysis to identify wear particles or corrosion products when a lubricating oil sample's particle count exceeds established limits or action levels will be required for the components in the scope of license renewal.

Operating Experience

A review of VEGP operating experience associated with the Oil Analysis Program shows that the program has been effective in preventing component failures due to oil contamination or degradation. Lubricating oil and hydraulic fluid samples have been identified which contain water or particulate contamination in excess of the established limits. Corrective actions for such instances have been performed in accordance with the Corrective Action Program. No instances of component failures attributed to lubricating oil or hydraulic fluid contamination or degradation have been identified.

In 2006, SNC personnel recognized significant differences between the lubricating oil monitoring practices at their three nuclear sites. A condition report was written by Farley Nuclear Plant personnel to document the existence of those differences. Action items were generated in response to this condition report, including actions to:

- Identify the best lubrication practices at each site.
- Identify appropriate tests, sampling frequencies, and acceptance criteria for diesel engine equipment, motors, pumps, transformers and turbines in the lubrication program at the three SNC sites.
- After the best lubrication practices, tests, sampling frequencies, and acceptance criteria have been identified, perform a “gap analysis” for the purpose of creating an SNC fleet-wide oil sampling and data analysis program.
- Prepare a fleet-wide oil analysis procedure.
- Standardize the SNC oil analysis program based on eliminating any identified gaps in the programs, adopting best practices across the SNC fleet, and incorporating updated requirements.

Completion of these actions will result in a common Oil Analysis Program which will provide enhanced equipment reliability by preventing failures which could be caused by operation with contaminated oil and by predicting failures of active components.

Conclusion

Continued implementation of the existing Oil Analysis Program, with enhancements as described above, will provide reasonable assurance that the aging effects will be managed such that the components in the scope of license renewal will continue to perform their intended function(s) during the period of extended operation.

B.3.17 ONE-TIME INSPECTION PROGRAM

Program Description

The VEGP One-Time Inspection Program is a new program that will be designed to provide objective evidence that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the period of extended operation, and therefore will not require additional aging management.

The new VEGP One-Time Inspection Program will use one-time inspections of plant piping and components to verify the effectiveness of aging management programs or to confirm the insignificance of potential aging effects where: a) an aging effect is not expected to occur but there is insufficient data to rule it out with reasonable confidence, b) an aging effect is expected to progress very slowly in a specified environment, but localized conditions may be more adverse than specified, or c) the characteristics of the aging effect include a long incubation period relative to the operating life of the plant.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

The inspections will be performed on in-scope systems and components as described below:

Material/Environment Combination	Aging Effect of Concern
Inspections performed to verify the effectiveness of aging management programs by confirming that unacceptable degradation is not occurring.	
<u>Water Chemistry Control Program</u> Internal surfaces of various components exposed to borated water, steam, or treated water	Loss of Material Cracking Reduction of Heat Transfer
<u>Diesel Fuel Oil Program</u> Internal surfaces of various components exposed to fuel oil; (Includes thickness verification of tank bottom surfaces)	Loss of Material
<u>Oil Analysis Program</u> Internal surfaces of various components exposed to hydraulic fluid or lubricating oil	Loss of Material Reduction of Heat Transfer

Material/Environment Combination	Aging Effect of Concern
Inspections performed to confirm that either an aging effect is not occurring, or is occurring so slowly as to not affect the component's intended function(s) during the period of extended operation	
Internal surfaces of carbon steel, cast iron and lead alloy components exposed to indoor air	Loss of Material
Internal surfaces of carbon steel components exposed to miscellaneous gas (gas of uncertain makeup)	Loss of Material
Internal surfaces of stainless steel components exposed to outdoor air when wetted	Loss of Material Cracking
Internal surfaces of aluminum alloy components exposed to outdoor air	Loss of Material
Internal surfaces of carbon steel components exposed to ventilation air	Loss of Material
Internal surfaces of copper alloy components exposed to domestic water	Loss of Material
Internal surfaces of carbon steel and stainless steel components exposed to clean drainage	Loss of Material
Internal surfaces of PVC components exposed to dirty drainage	Change in Material Properties
Internal surfaces of carbon steel components in the RCP Oil Collection System exposed to dirty drainage (Includes thickness verification of tank bottom surfaces)	Loss of Material
Internal surfaces of PVC components exposed to Nuclear Service Cooling Water	Change in Material Properties
Internal surfaces of stainless steel components exposed to treated water where the chemical environment has been show to accelerate aging of carbon steel	Loss of Material

The One-Time Inspection Program will include: (a) determination of sample size based on an assessment of the materials of fabrication, environment, plausible aging effects, and operating experience, (b) identification of the inspection locations in the system or component based on the aging effect, (c) determination of the examination technique, including acceptance criteria, that would be effective in identifying and quantifying the aging effect for which the component is examined, and (d) evaluation of the need for follow-up examinations to monitor the progression of aging, expansion of the sample size, or other corrective actions as appropriate if age-related degradation is found that could jeopardize an intended function before the end of the period of extended operation.

One-time inspections of components potentially susceptible to selective leaching are addressed by the One-Time Inspection Program for Selective Leaching (Appendix B.3.19). One-time inspections of ASME Class 1 piping less than or equal to NPS 4 are addressed by the One-Time Inspection Program for ASME Class 1 Small Bore Piping (Appendix B.3.18).

NUREG-1801 Consistency

The VEGP One-Time Inspection Program will be consistent with the program described in NUREG-1801, Section XI.M32, "One-Time Inspection."

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

There is no programmatic operating experience specifically applicable to the new one-time inspections. However, plant and industry operating experience will be considered in the selection of the initial component sample sets.

Conclusion

The new One-Time Inspection Program will provide reasonable assurance that either an aging effect is not occurring, or that the aging effect is occurring so slowly that the intended function of the component or structure will not be affected for the duration of the period of extended operation. In either case there would be no need to further manage the aging effect during the period of extended operation.

B.3.18 ONE-TIME INSPECTION PROGRAM FOR ASME CLASS 1 SMALL BORE PIPING

Program Description

The VEGP One-Time Inspection Program for ASME Class 1 Small Bore Piping is a new program designed to address NRC concerns on the potential for cracking of Class 1 piping with a diameter less than NPS 4. As stated in NUREG-1801, Section XI.M35, the NRC staff believes a one-time inspection program of ASME Class 1 Piping less than NPS 4 is necessary to detect cracking due to stress corrosion cracking and thermal and mechanical loading.

To address stress corrosion cracking concerns, volumetric examination of a sample population of ASME Class 1 Piping butt welds less than NPS 4 will be performed. Examination locations will be selected using a risk-based approach that will consider susceptibility, inspectability, dose, and operating experience.

To address unanticipated thermal fatigue cracking of ASME Class 1 piping less than NPS 4, VEGP will screen and evaluate pipe lines using MRP-146, "Management of Thermal Fatigue in Normally Stagnant Non-Isolable Reactor Coolant System Branch Lines," or later updated guidance. Small bore piping inspections to detect thermal fatigue will be performed only at piping locations that fail screening and are not monitored for thermal cycling.

Examinations performed by the program may be incorporated into an NRC approved Risk Informed Inservice Inspection Program. The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

VEGP will not volumetrically examine socket welds. Currently, a reliable and effective volumetric examination to detect cracking in socket welds is not available. The VEGP ISI Program (Appendix B.3.13) performs periodic VT-2 visual examinations of ASME Class 1 Piping socket welds at each refueling outage.

NUREG-1801 Consistency

The VEGP One-Time Inspection Program for ASME Class 1 Small Bore Piping is a new program consistent with NUREG-1801, Section XI.M35, "One-time Inspection of ASME Code Class 1 Small-Bore Piping," with exceptions.

Exceptions to NUREG-1801

The VEGP One-Time Inspection Program for ASME Class 1 Small Bore Piping will be consistent with NUREG-1801, Section XI.M35, "One-time Inspection of ASME Code Class 1 Small-Bore Piping," with the following exceptions.

Elements Affected	Exception
5. Monitoring and Trending	NUREG-1801, Section XI.M35, specifies volumetric examination to detect cracking due to thermal fatigue. VEGP will screen and evaluate pipe lines using MRP-146, or later updated guidance. Inspections of small bore piping to detect thermal fatigue will be performed only at piping locations that fail the screening and are not monitored for thermal cycling.
6. Acceptance Criteria	Acceptance criteria at the time of inspection will be based on the plant-specific VEGP Inservice Inspection Program in conformance with 10 CFR 50.55a. NUREG-1801, Section XI.M35 specifies acceptance criteria from ASME Section XI, 2001 Edition with 2002 and 2003 Addenda.

Enhancements

None

Operating Experience

There is no programmatic operating experience specifically applicable to this new program. However, plant and industry operating experience will be considered in the selection of the component sample set. Screening, evaluation, and inspection of piping locations for thermal fatigue will be based on industry guidance that incorporates industry operating experience and applicable research data.

VEGP experienced leakage in small-bore RHR bypass lines due to inadequate design. Four leakage events occurred on an RHR loop suction valve bypass line between December 2005 and March 2006, resulting in un-isolable RCS pressure boundary leakage. Previously, there had not been any identified through wall leakage in the bypass line since original construction and start-up 16 years earlier.

The ¾” diameter bypass line was installed as part of the original design. The purpose of the bypass line is to relieve pressure between the two RHR loop suction isolation gate valves. In 2002, a modification was made, using this original line to relieve excess pressure in the valve bonnet and between the valve disks back towards the RCS. The first leak that occurred, in December 2005, was at one of the welds made in 2002.

An extensive root cause evaluation was performed to determine the cause of the leaks. The evaluation determined that the RHR pipe from the RCS nozzle to the closed valve was pulsing from acoustic vibration caused by RCS flow past the nozzle. The RCS flow past the nozzle causes vortex shedding and is based on flow rate and nozzle size. The vortex shedding provides energy to drive the acoustic vibration of the RHR pipe. Because the bypass line was not axially restrained, the combination of resonance from the vortex shedding and other factors caused the RHR piping to vibrate with sufficient amplitude to increase stress at the break locations above the endurance limit of the material, resulting in fatigue cracks.

The bypass line and leak-off lines on Unit 2, Loop 1, where the leakage events occurred, have been removed. Temporary accelerometers were installed on both Unit 2 bypass lines and are currently being monitored. Thus far, the vibration levels remain acceptable. Based on the results of the root cause evaluation, SNC concludes that the problem is due to a design-related issue and not an aging effect requiring management.

Conclusion

The One–Time Inspection Program for ASME Class 1 Small Bore Piping will provide reasonable assurance that cracking of small bore piping due to stress corrosion or unanticipated thermal fatigue will be adequately managed so that the component intended functions will be maintained consistent with the CLB for the period of extended operation.

B.3.19 ONE-TIME INSPECTION PROGRAM FOR SELECTIVE LEACHING

Program Description

The VEGP One-Time Inspection Program for Selective Leaching is a new program that will be a one-time inspection program to assess selective leaching in susceptible cast iron and copper alloy components. The program includes a one-time examination of a sample population of components most likely to exhibit selective leaching. Initial examinations will be completed prior to entering the period of extended operation. If degradation due to selective leaching is identified, additional examinations will be performed.

Examination techniques may include hardness measurement (where feasible based on form and configuration), visual examination, metallurgical evaluation, or other proven techniques determined to be effective in identifying and assessing the extent of selective leaching.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

NUREG-1801 Consistency

The VEGP One-Time Inspection Program for Selective Leaching will be consistent with the program described in NUREG-1801, Section XI.M33, “Selective Leaching of Materials,” with an exception.

Exceptions to NUREG-1801

The VEGP One-Time Inspection Program for Selective Leaching will be consistent with the program described in NUREG-1801, Section XI.M33, “Selective Leaching of Materials,” with the following exception.

Elements Affected	Exception
1. Detection of Aging Effects	NUREG-1801, Section XI.M33, specifies visual inspection and hardness measurement to detect selective leaching. The VEGP Selective Leaching Program may use other detection techniques instead of, or in addition to, visual examination and hardness measurement. For some component locations, visual examination and hardness measurement may not be feasible due to geometry and configuration issues. Additionally, other examination methods may be shown to be equally effective in detecting and assessing the extent of selective leaching.

Enhancements

None

Operating Experience

The operating experience review performed for license renewal did not identify any incidents of selective leaching at VEGP. There is no VEGP programmatic operating experience specifically applicable to the new one-time inspections for selective leaching. However, plant and industry operating experience will be considered in the selection of the initial component sample set.

Conclusion

The VEGP One-Time Inspection Program for Selective Leaching will provide reasonable assurance that selective leaching is not occurring, or is occurring slowly enough to not affect the component or structure intended function during the period of extended operation.

B.3.20 OVERHEAD AND REFUELING CRANE INSPECTION PROGRAM

Program Description

The VEGP Overhead and Refueling Crane Inspection Program is an existing program that manages the effects of general corrosion and wear of the crane bridge and trolley structural girders and beams and the crane rails and support girders in the scope of license renewal.

The Overhead and Refueling Crane Inspection Program is a condition monitoring program that includes the following nuclear safety-related and quality related material handling systems: Refueling Machine, Fuel Handling Machine Bridge Crane, Spent Fuel Cask Bridge Crane, and the Containment Building (Reactor) Polar Crane.

The Overhead and Refueling Crane Inspection Program is based on guidance contained in ANSI B30.2 for overhead cranes. The basis for inspecting the cranes is found in NUREG-0612.

NUREG-1801 Consistency

The VEGP Overhead and Refueling Crane Inspection Program is consistent with the program described in NUREG-1801, Rev. 1, Section XI.M23, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems.”

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

A review of the operating history of the overhead and refueling cranes revealed that there has been no significant degradation of the crane bridge and trolley structural girders and beams, or the crane rails and support girders, and that the program has been effective at managing aging effects for the overhead and refueling cranes.

Inspections from 2001 to 2006 identified minor degradation such as misalignment of crane rails, loose crane rail hold down bolts, wire rope reeving problems, reductions in wire rope diameter, wear on a fuel handling crane roller assembly, and minor flaw indications. Condition Reports were written and the conditions evaluated and resolved under the Corrective Actions Program.

Conclusion

Continued implementation of the VEGP Overhead and Refueling Crane Inspection Program provides reasonable assurance that the effects of general corrosion on the crane bridge and trolley structural girders and beams and the crane rails and support girders for the spent fuel bridge cranes, the spent fuel cask cranes and the containment polar cranes will be managed during the period of extended operation.

B.3.21 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE ACTIVITIES

Program Description

The Periodic Surveillance and Preventive Maintenance Activities is an existing program that will include existing and new periodic inspections and tests that are relied on by license renewal to manage the aging effects applicable to the components included in the program. The Periodic Surveillance and Preventive Maintenance Activities are generally implemented through repetitive tasks and surveillances.

The program activities credited for license renewal are described under Detection of Aging Effects.

Enhancements to the Periodic Surveillance and Preventive Maintenance Activities will be implemented prior to the period of extended operation.

Program Scope

The VEGP Periodic Surveillance and Preventive Maintenance Activities, with regard to license renewal, includes those preventive maintenance and surveillance activities credited with managing the aging effects described in the aging management reviews. These activities are described under Detection of Aging Effects.

Preventive Actions

The Periodic Surveillance and Preventive Maintenance Activities is a condition monitoring program. The inspections and testing activities used to identify component aging effects do not prevent aging effects. However, the activities are intended to prevent component failures that might be caused by aging effects.

Parameters Monitored or Inspected

For each inspection or test activity, instructions on the parameters monitored or inspected are provided to permit early detection of degradation prior to loss of component intended function. The parameters monitored or inspected are dependent on the component(s) and aging effects being managed. Inspection and testing activities monitor various parameters such as surface condition, loss of material, presence of corrosion products or fluid leakage, signs of cracking, or reduction of wall thickness.

Detection of Aging Effects

Periodic Surveillance and Preventive Maintenance Activities provide for periodic component inspections and testing to detect aging effects. Intervals are established to provide timely detection of degradation. Inspection and testing intervals are dependent on the component, material, and environment, and take into consideration industry and plant-specific operating experience and manufacturer's recommendations.

The extent and schedule of inspections and testing assure detection of component degradation prior to loss of intended functions. Established techniques such as visual inspections are used.

<u>Control Building Control Room Filter Unit Seal Inspections</u>

A visual inspection of the Control Building Control Room Filter Unit seals is performed as part of the Control Room Emergency Filtration System (CREFS) filter testing required by the Technical Specifications.

<u>Emergency Diesel Generator (EDG) Diesel Fuel Oil Storage Tanks</u>

Cleaning and inspection of the EDG Diesel Fuel Oil Storage tanks is an existing preventive maintenance task. The tanks are visually inspected to detect degradation of the applied inorganic zinc coating or the underlying base material. Consistent with the plant Technical Specifications, this cleaning and visual inspection task is performed once every ten years.

Note: The One-Time Inspection Program will perform wall thickness measurement of the EDG diesel fuel oil storage tank bottoms.

<u>Heat Exchanger Inspections</u>

Visual inspection of the Steam Generator Blowdown Trim Heat Exchanger is an existing preventive maintenance task. Inspection by visual or other NDE technique of the Secondary Steam Generator Blowdown Sample Bath and the Steam Generator Blowdown Corrosion Product Monitor cooler are new preventive maintenance tasks that manage loss of material from the interior of the shells of these heat exchangers. These heat exchangers are cooled by well water or river water but not by Nuclear Service Cooling Water, therefore they are not in the scope of the Generic Letter 89-13 Program.

<u>NSCW Cooling Tower Fill and Drift Eliminator Testing</u>

Visual inspection of the NSCW Cooling Towers is an existing preventive maintenance task that includes collecting sample specimens of the tower fill and drift eliminators. Failure load testing of the specimens is performed to evaluate deterioration of the tower fill and drift eliminators.

Potable Water System Water Heater Housings

Visual inspection of the in-scope Potable Water System water heater housings is a new preventive maintenance task that will manage loss of material by inspecting for evidence of leakage and loss of material on the housing.

Water Storage Tank Diaphragm Inspections

Visual inspections of the Boric Acid Storage Tank (BAST), Condensate Storage Tank (CST), and Reactor Make-up Water Storage Tank (RMWST) diaphragms are existing preventive maintenance tasks that manage change in material properties (including cracking) and loss of material on the internal elastomer diaphragms in these tanks.

Monitoring and Trending

Preventive maintenance and surveillance testing activities provide for monitoring and trending of age-related degradation. Inspection and testing intervals are established such that they provide for timely detection of component degradation. Inspection and testing intervals are dependent on the component, material, and environment, and take into consideration industry and plant-specific operating experience and manufacturer's recommendations.

The frequency of inspection or other activities is subject to change based on plant specific environments or observed degradation. Such observations may dictate that an increased or decreased task frequency would be appropriate for a particular activity.

Acceptance Criteria

Acceptance criteria for the Periodic Surveillance and Preventive Maintenance Activities will be defined in specific inspection and testing procedures. The acceptance criteria confirm component integrity by verifying the absence of aging effect(s), or by comparing applicable parameters to limits based on applicable intended function(s) established by the plant's design basis.

Acceptance criteria will be included that directly correlate to the aging effects requiring management applicable to the activity. The acceptance criteria will be based on codes, standards, specifications, vendor recommendations, industry guidance, engineering judgment, and/or site operating experience as applicable.

Degradations deemed to be unacceptable will have a Condition Report initiated. Resolution of the unacceptable condition will be handled under the corrective action process.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

<u>Control Building Control Room Filter Unit Seal Inspections</u>

Periodic visual inspections have identified instances of degradation of the filter unit door seals, indicating that the program to monitor these seals is effective.

<u>Emergency Diesel Generator Fuel Oil Storage Tanks</u>

As noted in the Diesel Fuel Oil Program operating experience discussion, recent 10-year cleaning and visual inspection of the EDG Fuel Oil Storage Tanks did not identify any degradation of the inorganic zinc coating or tank base metal.

<u>Heat Exchanger Inspections</u>

Periodic inspections of the Steam Generator Blowdown Trim Heat Exchangers are performed to identify fouling, corrosion, and other adverse conditions. These inspections have identified fouling of the heat exchangers, but not corrosion.

The Secondary Steam Generator Blowdown Sample Baths and the Steam Generator Blowdown Corrosion Product Monitor coolers do not currently have inspection reptasks, so no inspection history is available. Review of the maintenance history of these heat exchangers did not identify any instances of corrosion.

These heat exchangers are only in scope for pressure boundary due to 10 CFR 54.4(a)(2) concerns, so the shell only needs to be managed for loss of material. Reduction of heat transfer is not an aging effect requiring management for these heat exchangers.

NSCW Cooling Tower Inspections

Failure load testing of the tower fill and drift eliminators has been performed since 1988. Through the latest report in 2003, no specimens have failed to meet the acceptance criteria, and the projected lifetime of the tower fill and drift eliminators indicates that the material deteriorates at a slow rate in the tower environment.

Potable Water System Water Heater Housings

The Potable Water System water heater housings do not currently have scheduled inspection repetitive tasks, so no history regarding the planned tasks is available. Review of the maintenance history of these heat exchangers did not identify any instances of leakage due to corrosion.

Water Storage Tank Diaphragm Inspections

The original BAST, CST, and RMWST diaphragms have been replaced with diaphragms constructed of an improved elastomer material. Since their replacement, the periodic bladder inspections have identified several instances of tears in the diaphragms. The diaphragm vendor attributed the tears to improper operation, not aging. The tanks were not being maintained with a nitrogen blanket between the diaphragm and the water. Without a nitrogen blanket, the diaphragms can “stick” to the tank wall, creating sufficient force to tear the diaphragm during a level change. Procedures have been put in place to correct the operational deficiency. No aging related failures have been observed since the diaphragms were replaced.

Enhancements

The following enhancement will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
1. Scope of Program 2. Parameters Monitored and Inspected 4. Detection of Aging Effects 6. Acceptance Criteria	The program will be enhanced by adding inspections of the following components: • Steam Generator Blowdown Secondary Sample Bath shells for loss of material • Steam Generator Blowdown Corrosion Product Monitor cooler shells for loss of material • Potable Water System water heater housings for the in-scope water

	heaters

Conclusion

The Periodic Surveillance and Preventive Maintenance Activities provide reasonable assurance that the effects of aging will be managed such that the applicable components will continue to perform their intended functions consistent with the current licensing basis during the period of extended operation.

B.3.22 PIPING AND DUCT INTERNAL INSPECTION PROGRAM

Program Description

The VEGP Piping and Duct Inspection Program is a new program that will manage corrosion of steel, stainless steel, and copper alloy components and degradation of elastomer components due to changes in material properties. Components included in the scope of this program are not addressed by other aging management programs. Inspections will normally be performed concurrent with scheduled preventive maintenance, surveillance testing, and corrective maintenance activities. Specific examinations not coordinated with existing work activities may also be performed at the discretion of the program owner. Inspection locations and intervals will be dependent on assessments of the likelihood of significant degradation and on current industry and plant-specific operating experience.

Examination techniques will be appropriate to detect and assess the aging mechanism of concern and may include visual examination, non-visual NDE such as ultrasonic testing or radiography, physical manipulation of elastomers, etc.

The Piping and Duct Internal Inspection Program is a new program that will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Piping and Duct Internal Inspection Program will be consistent with the program described in NUREG-1801, Section XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components,” with exceptions.

Exceptions to NUREG-1801

The VEGP Piping and Duct Internal Inspection Program will be consistent with the program described in NUREG-1801, Section XI.M38, “Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components,” with the following exceptions.

Elements Affected	Exception
1. Scope of Program	The program scope described in NUREG-1801, Section XI.M38, includes only steel piping, piping components, ducting, and other components. The VEGP Piping and Duct Internal Inspection Program also includes stainless steel, copper alloy and elastomer components.

Elements Affected	Exception
3. Parameters Monitored / Inspected	The VEGP Piping and Duct Inspection Program will monitor not only component surfaces through visual examination, but may also use non-visual techniques to monitor parameters such as wall thickness and ductility.
4. Detection of Aging Effects 5. Monitoring and Trending	The VEGP Piping and Duct Internal Inspection Program may use other detection techniques instead of, or in addition to, visual examination. For some materials or component locations, visual examination may not be the most appropriate inspection technique or may not be feasible due to geometric or other limitations. This difference is justified because other examination methods can be shown to be equally effective in detecting and assessing degradation.
6. Acceptance Criteria	The VEGP Piping and Duct Internal Inspection Program will include acceptance criteria for both visual and non-visual techniques. Acceptance criteria will be defined in program procedures. For physical manipulation or destructive examination of elastomers, no indication of unacceptable hardening, de-lamination, or cracking of the elastomer is acceptable. For thickness measurements of steel, stainless steel, and copper alloy components, remaining wall thickness must be sufficient to provide reasonable assurance that the component will continue to perform its component function until the next scheduled inspection.

Enhancements

None

Operating Experience

There is no programmatic operating experience specifically applicable to this new program. However, plant and industry operating experience will be considered in selecting inspection locations, determining inspection intervals, and prescribing appropriate inspection techniques.

Visual inspection techniques and NDE techniques such as ultrasonic (UT) examinations are well proven in the industry and have been demonstrated as effective means for detecting degradation. Inspections of internal surfaces during the performance of periodic surveillances and maintenance activities have proven effective in maintaining the material condition of plant systems, structures, and components.

The VEGP program is based on the program described in NUREG-1801, which is based on industry operating experience. The VEGP plant-specific operating experience is not inconsistent with the operating experience described in the NUREG-1801 program.

Conclusion

The VEGP Piping and Duct Internal Inspection Program will provide reasonable assurance that the applicable aging effects will be managed such that the components within the scope of this program will continue to perform their intended functions during the period of extended operation.

B.3.23 REACTOR VESSEL CLOSURE HEAD STUD PROGRAM

Program Description

The VEGP Reactor Vessel Closure Head Stud Program is an existing program, which includes preventive measures as described in Regulatory Guide 1.65 and inservice inspection to manage loss of material and cracking in the reactor vessel closure head studs, nuts and washers.

Preventive measures include material controls and the use of approved lubricants. The VEGP reactor vessel head studs are fabricated from modified SA-540 Grade B24 material as specified in ASME Boiler and Pressure Vessel Code Case 1605. This Code Case is not specified in Regulatory Guide 1.65, but has been approved by the NRC via Regulatory Guide 1.85. VEGP actual stud material properties have ultimate tensile strengths less than 170 ksi. Reactor vessel closure head studs and nuts are lubricated with an approved, stable lubricant at each reassembly.

Condition monitoring includes visual and volumetric examinations and leakage detection consistent with the VEGP Inservice Inspection Program. These inspections are implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI for Class 1, 2 and 3 pressure-retaining components and their integral attachments.

The VEGP Inservice Inspection Program 2nd inspection interval ended in May 2007. The VEGP 3rd inservice inspection interval requirements are based on ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda.

NUREG-1801 Consistency

The VEGP Reactor Vessel Closure Head Stud Program is an existing program that is consistent with the program described in NUREG 1801, Section XI.M3, “Reactor Head Closure Studs,” with exceptions.

Exceptions to NUREG-1801

The VEGP Reactor Vessel Closure Head Stud Program is an existing program that is consistent with the program described in NUREG 1801, Section XI.M3, "Reactor Head Closure Studs," with the following exceptions.

Elements Affected	Exception
3. Parameters Monitored/Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria	NUREG-1801, Section XI.M3, describes the program as conforming to the requirements of ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda. However, 10 CFR 50.55a governs the application of Codes and Standards. While the VEGP Inservice Inspection Program for the 3rd inspection interval will use the 2001 Edition including the 2002 and 2003 Addenda, the program will be updated in conformance with 10 CFR 50.55a for future inspection intervals. Additionally, volumetric examinations are in compliance with the performance demonstration initiative. This initiative program is currently based on Appendix VIII, 2001 Edition of Section XI as mandated by 10 CFR 50.55a. These differences are considered to be an exception to NUREG-1801, Rev. 1, Section XI.M3.
4. Detection of Aging Effects	The program described in NUREG-1801, Rev. 1, Section XI.M3 includes visual, surface, and volumetric examinations. The VEGP 3rd inservice inspection interval requirements will be based on ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda. This edition of the ASME Code does not require surface examinations and the VEGP program will not include surface examination of the reactor vessel closure head studs unless required by a future Code Edition specified in 10 CFR 50.55a.

Enhancements

None

Operating Experience

VEGP Reactor Vessel Closure Head Stud Program inspections are based on ASME Code requirements. Because the ASME Code is a consensus document that has been widely used over a long period, it has been shown to be effective in managing aging effects in components and their integral attachments.

The VEGP Reactor Vessel Closure Head Stud Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews are performed.

Review of recent VEGP records identified pitting of the nuts and washers for three Unit 2 closure stud assemblies. Based on engineering judgment, the affected nuts and washers no longer met minimum contact surface requirements and were replaced.

Conclusion

Continued implementation of the VEGP Reactor Vessel Closure Head Stud Program provides reasonable assurance that the aging effects will be managed such that the systems and components crediting the program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.24 REACTOR VESSEL INTERNALS PROGRAM

Program Description

The Reactor Vessel Internals Program is a new program that addresses material degradation issues for the VEGP reactor vessel internals.

The program will be based on the following set of implementation commitments:

- SNC will participate in the industry program for investigating and managing aging effects on reactor vessel internals.
- SNC will evaluate and implement the results of the industry programs, such as the EPRI Material Reliability Program (MRP), as applicable to the VEGP reactor vessel internals.
- SNC will submit an inspection plan for the VEGP reactor vessel internals to the NRC for review and approval not less than 24 months before entering the period of extended operation for VEGP Units 1 and 2.

The Reactor Vessel Internals Program will be implemented prior to the period of extended operation.

Since the program attributes have not yet been fully developed, assessments for each of the ten aging management program elements are not included. However, assessments for each of the ten elements will be included in the inspection plan submitted to the NRC for review and approval. The program implementation commitments are consistent with the aging management program commitments listed in NUREG-1801, Section IV.B2, for managing PWR reactor vessel internals.

The scope of components to be included in the program includes all of the components and aging effects described in NUREG-1801, Rev. 1, Section IV.B2, with the following differences:

1) The VEGP Reactor Vessel Internals Program will manage wear of reactor vessel internals components. NUREG-1801, Section IV.B2, credits Inservice Inspection Program visual inspections to manage wear of the reactor vessel internals. Reactor vessel internals inspection and evaluation guidance currently in development by the EPRI MRP Reactor Internals Focus Group will consider the potential for wear of reactor vessel internals components. The resulting inspection requirements may or may not align with existing ASME Section XI inspection requirements.

2) The VEGP Reactor Vessel Internals Program will manage embrittlement of the VEGP Bottom Mounted Instrumentation Column Cruciforms, which are the only VEGP cast austenitic stainless steel (CASS) reactor vessel internals components. These Cruciforms are ASME SA-351 Grade CF8 castings. NUREG-1801, Section IV.B2, credits the program described in NUREG-1801, Section XI.M13, “Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel (CASS)” to manage embrittlement of cast austenitic stainless steel reactor vessel internals due to thermal aging and irradiation embrittlement.

   Reactor vessel internals inspection and evaluation guidance currently in development by the EPRI Reactor Internals Focus Group will consider the potential embrittlement of cast austenitic stainless steel reactor vessel internals. SNC will include the inspection and evaluation requirements resulting from this industry effort, applicable to the VEGP Bottom Mounted Instrumentation Column Cruciforms, in the Reactor Vessel Internals Program.

3) The Reactor Vessel Internals Program will manage cracking of the reactor vessel core support lugs, pads, and associated attachment welds. NUREG-1801, Section IV.A2, does not credit the Reactor Vessel Internals Program for this component and aging effect combination.

4) The Reactor Vessel Internals Program will manage wear of the reactor vessel closure head thermal sleeves. NUREG-1801, Sections IV.A2 and IV.B2, do not address reactor vessel head thermal sleeves.

Operating Experience

The Reactor Vessel Internals Program will be a new program. Accordingly, there is no programmatic history. The program will be based upon industry operating experience, research data, and vendor evaluations. Development of the program will rely upon the consensus opinion of the EPRI MRP Reactor Internals Focus Group, which includes representatives from utilities, research scientists, and vendors. For the reactor vessel thermal sleeves, the program will be developed based on VEGP data and on vendor recommendations.

During the Unit 2 Spring 2007 refueling outage, a number of reactor vessel head thermal sleeves were found to have experienced wear up to 360° around the thermal sleeve where the thermal sleeve exits the bottom end of the CRDM penetration tube. Wear was identified in both rodded and unrodded penetration locations, with the wear at unrodded locations being more severe than at the rodded locations. Initial evaluation attributes the wear to contact with the penetration tubes due to flow-induced oscillations. The wear was of varying magnitudes with more significant wear at nine locations and minimal wear at 23 locations.

As a result of these wear indications, lower sections of the four thermal sleeves experiencing the most extensive wear were removed up to a point well above the vessel penetration weld.

All four of the removed sleeves were in unrodded penetration locations. The remaining thermal sleeves will be re-inspected at the next scheduled refueling outage, at which time assessments will be performed to identify additional monitoring requirements and corrective actions.

Earlier in plant life, VEGP preemptively replaced the original Unit 1 and Unit 2 Alloy X-750 Control Rod Guide Tube Support Pins with strain hardened Type 316 stainless steel support pins based on industry experience with PWSCC in Alloy X-750 support pins.

Conclusion

Implementation of the Reactor Internals Program, consistent with the implementation commitments provided, will provide reasonable assurance that the reactor internals components will continue to perform their intended function(s) during the period of extended operation.

B.3.25 REACTOR VESSEL SURVEILLANCE PROGRAM

Program Description

The Reactor Vessel Surveillance Program (RVSP) is an existing condition monitoring program that manages loss of fracture toughness due to neutron embrittlement in reactor vessel alloy steel materials exposed to neutron fluence exceeding 1 x 10^{17} n/cm^2 (E > 1.0 MeV). The program is based on 10 CFR 50, Appendix H, “Reactor Vessel Material Surveillance Requirements“ and ASTM E 185-82, “Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels.”

Capsules are periodically removed during the course of plant operating life. Neutron embrittlement is evaluated through surveillance capsule testing and evaluation, fluence calculations and benchmarking, and monitoring of effective full power years (EFPYs).

Best-estimate values of reactor vessel accumulated neutron fluence are determined utilizing analytical models that satisfy the guidance contained in NRC Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence.” Analytical results are benchmarked utilizing dosimetry data.

Data resulting from the RVSP is used to:

- Assess pressure-temperature limits, minimum temperature requirements, and end of life upper shelf energy (USE) in accordance with the requirements of 10 CFR 50 Appendix G, “Fracture Toughness Requirements,” and
- Assess end of life RT_{PTS} values in accordance with 10 CFR 50.61, “Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock.”

For both the VEGP Unit 1 and 2 reactor vessels, capsules with accumulated neutron fluence equivalent to 60 years of operation have already been pulled and tested. The remaining capsules (2 capsules in each unit) will be removed such that, at the time of removal, each of the remaining capsules will have accumulated neutron fluence that is not less than once, nor greater than twice, the peak end of life fluence expected for an additional 20-year license renewal term (80 years of operation).

The Reactor Vessel Surveillance Program will be enhanced prior to the period of extended operation.

NUREG-1801 Consistency

The Reactor Vessel Surveillance Program is consistent with the program described in NUREG-1801, Section XI.M31, “Reactor Vessel Surveillance,” with exceptions and enhancements.

Exceptions to NUREG-1801

The VEGP Reactor Vessel Surveillance Program is consistent with the program described in NUREG 1801, Section XI.M31, “Reactor Vessel Surveillance,” with the following exception.

Elements Affected	Exception
NUREG-1801, Section XI.M31, Item 6 *“If an applicant has a surveillance program that consists of capsules with a projected fluence exceeding the 60-year fluence at the end of 40 years, the applicant withdraws one capsule at an outage in which the capsule receives a neutron fluence equivalent to the 60-year fluence and tests the capsule in accordance with the requirements of ASTM E 185. Any capsules that are left in the reactor vessel provide meaningful metallurgical data (i.e., the capsule fluence does not significantly exceed the vessel fluence at an equivalent of 60 years). For example, in a reactor with a lead factor of three, after 20 years the capsule test specimens would have received a neutron exposure equivalent to what the reactor vessel would see in 60 years; thus, the capsule is to be removed because further exposure would not provide meaningful metallurgical data. Other standby capsules are removed and placed in storage. These standby capsules (and archived test specimens available for reconstitution) would be available for reinsertion into the reactor if additional license renewals are sought (e.g., 80 years of operation)…”*	For both the VEGP Unit 1 and 2 reactor vessels, capsules with an accumulated neutron fluence equivalent to 60 years of operation have already been pulled and tested. Currently, two capsules remain in each of the Unit 1 and Unit 2 reactor vessels. SNC will remove these remaining capsules such that at the time of removal, each of the remaining capsules will have an accumulated neutron fluence that is not less than once nor greater than twice the peak end of life fluence expected for an additional 20-year license renewal term (80 years of operation). Removal of the remaining capsules at a fluence equivalent to 80 years of operation is appropriate because meaningful data is provided to support a possible second license renewal term and because capsule data for fluences equivalent to 60 years of operation fluence has already been obtained. A similar exception was accepted by the staff for the Joseph M. Farley Nuclear Plant in Section 3.0.3.2.2 of NUREG-1825, “Safety Evaluation Report Related to the License Renewal of the Joseph M. Farley Nuclear Plant, Units 1 and 2.”

Enhancements

The Reactor Vessel Surveillance Program will be enhanced as follows:

Elements Affected	Enhancement
NUREG-1801, Section XI.M31, Item 4 *"All pulled and tested capsules, unless discarded before August 31, 2000, are placed in storage…"*	Prior to removal of the last surveillance capsule in each unit, program documents will be revised to require that tested and untested specimens from all capsules removed from the VEGP reactor vessels remain in storage.
NUREG-1801, Section XI.M31, Item 7 *"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 (aging management program) for reactor vessel neutron embrittlement."*	Alternate dosimetry will be installed to monitor neutron fluence on the reactor vessel after removal of the last surveillance capsule in that unit. This enhancement will be implemented prior to removal of the last surveillance capsule in each unit.

Operating Experience

The Reactor Vessel Surveillance Program, described in FSAR Section 5.3, has provided materials embrittlement and dosimetry data since plant startup. The program has been reviewed and approved by the NRC for use in the current operating term. Surveillance specimens have been removed and tested. Where applicable, credible data from these specimens have been used to verify embrittlement rates and predict future performance of reactor vessel materials with regard to neutron embrittlement.

For Unit 1, the most recent results submitted to the NRC are documented in WCAP-16278-NP, Revision 0. For Unit 2, the most recent results submitted to the NRC are documented in WCAP-16382-NP, Revision 0. Both of these reports include data from surveillance capsules exposed to neutron fluence equivalent to 60 years of operation.

Conclusion

Continued implementation of the VEGP Reactor Vessel Surveillance Program, along with evaluation of associated neutron embrittlement TLAAs, provides reasonable assurance that the neutron embrittlement of reactor vessel materials will be adequately managed such that the components within the scope of the program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.26 STEAM GENERATOR TUBING INTEGRITY PROGRAM

Program Description

The Steam Generator Tubing Integrity Program (SGTIP) is an existing subprogram of the VEGP Steam Generator Program, which is an integrated program for managing the condition of the VEGP Steam Generators. The SGTIP focuses on steam generator tube integrity, tube plugging, and the management and repair of SG tubing. The Program is in compliance with the program described in NEI 97-06, Steam Generator Program Guidelines and VEGP Technical Specifications, Section 5.5.9. Program deviations from NEI 97-06 are prepared and approved in accordance with NEI 97-06 and EPRI steam generator management program guidance.

The VEGP SGTIP incorporates performance criteria for structural integrity, accident-induced leakage, and operational leakage consistent with NEI 97-06 and VEGP Technical Specifications.

The program includes a balance of prevention, inspection, evaluation and repair, and leakage monitoring. Major program elements include degradation assessments, inspection, integrity assessments, leakage monitoring, and chemistry controls.

EPRI documents referenced by NEI 97-06 include guidelines for SG examination, integrity assessment, primary to secondary leakage monitoring, in-situ testing, and water chemistry controls. The VEGP Water Chemistry Control Program (Appendix B.3.28) maintains water chemistry controls for primary and secondary water chemistry.

NUREG-1801 Consistency

The Steam Generator Tubing Integrity Program is consistent with the program described in NUREG-1801, Rev. 1, Section XI.M19, “Steam Generator Tube Integrity,” with an exception.

Exceptions to NUREG-1801

The Steam Generator Tubing Integrity Program is consistent with the program described in NUREG-1801, Section XI.M19, "Steam Generator Tube Integrity," with the following exception.

Elements Affected	Exception
1. Program Scope 2. Preventive Actions 4. Detection of Aging Effects 5. Monitoring and Trending	NUREG-1801, Section XI.M19, references Revision 1 of NEI 97-06, "Steam Generator Program Guidelines." The VEGP SGTIP Program will be periodically updated to conform to the latest revision of NEI 97-06. Currently, the VEGP SGTIP is implemented in accordance with Revision 2 of NEI 97-06. This difference is considered to be an exception to NUREG-1801, Section XI.M19.

Enhancements

None

Operating Experience

VEGP has Westinghouse Model F steam generators with thermally treated Alloy 600 tubes. The tubes are hydraulically expanded for the full-depth of the tubesheet at each end and are supported by stainless steel broached hole quatrefoil tube supports and chrome-plated Inconel anti-vibration bars. The tubes are arranged on a square pitch.

Active degradation mechanisms recognized in the VEGP Unit 1 steam generators include PWSCC related to tubesheet joint bulges and over-expansions, circumferential outside diameter stress corrosion cracking (ODSCC) at the expansion transition, and axial ODSCC at the top of the tubesheet. PWSCC in tubesheet bulges was identified in Unit 1 during the spring 2005 refueling outage. ODSCC at the expansion region was identified in Unit 1 during the fall 2006 refueling outage. As a result of these PWSCC and ODSCC indications identified in Unit 1, a number of tubes have been plugged and stabilized.

No active degradation mechanisms have been identified in the VEGP Unit 2 steam generators. In the most recent Unit 2 SG eddy current inspection conducted during the Spring 2007 refueling outage, no degradation mechanisms were detected and no SG tubes were plugged.

Anti-Vibration bar wear and tube wear due to interaction with loose parts or foreign objects have been identified as a relevant degradation mechanisms for VEGP. Relevant degradation mechanisms are those found in similar plants with the same tubing material and with similar design features.

In 2002, sodium hexametaphosphate was inadvertently added to the condensate chemical feed tanks on both units. This error resulted in exceeding the action level 3 limits for sodium in the steam generators. Both units were immediately shut down in order to reduce the high sodium and phosphate concentrations. While the sodium was effectively removed using fill and drain processes, significant phosphate residuals remain trapped in the steam generator due to interaction with steam generator internal surfaces and sludge. Small, but significant phosphate levels return from hideout during start-ups. As a result, the VEGP Water Chemistry Control Program was modified to include phosphate action levels, and molar ratio control was discontinued. During the last refueling outage for each VEGP unit, chemical cleaning of the secondary side was performed, removing approximately 7000 pounds of scale deposit from Unit 1 and 5000 pounds from Unit 2. Based on the removal of scale deposit and associated adsorbed phosphate, SNC is monitoring plant chemistry parameters to determine the best time to re-initiate molar ratio control.

The SGTIP incorporates new industry operating experience and research data to periodically improve the program. EPRI steam generator guidelines forming the technical basis for the program are the result of a consensus process and are periodically updated by EPRI. The VEGP Steam Generator Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews and assessments are performed.

Review of recent VEGP Steam Generator Program performance results show that the program has been effective in finding and correcting degradation attributable to aging effects requiring management.

Conclusion

Continued implementation of the VEGP Steam Generator Tubing Integrity Program provides reasonable assurance that the aging effects will be managed such that the steam generator tubes will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.27 STEAM GENERATOR PROGRAM FOR UPPER INTERNALS

Program Description

The Steam Generator Program for Upper Internals is an existing plant-specific subprogram of the VEGP Steam Generator Program, which is an integrated program for managing the condition of the steam generators at VEGP. The Steam Generator Program is in compliance with the program described in NEI 97-06, Steam Generator Program Guidelines.

The Steam Generator Program for Upper Internals is a plant specific program that includes VEGP Steam Generator Program activities associated with aging management of the steam generator upper internals components determined to be within the scope of license renewal.

Program Scope

The program scope includes the following components:

- Auxiliary Feedwater Spray Piping
- Auxiliary Feedwater Nozzle Thermal Sleeve
- Feedwater Distribution Assembly Piping and Fittings
- Feedwater Inlet Nozzle
- Feedwater Inlet Nozzle Thermal Sleeve
- Feedwater J-Tubes
- Moisture Separator Assembly - Primary
- Moisture Separator Assembly - Secondary

Preventive Actions

Consistent with NEI 97-06, the program relies upon water chemistry controls to prevent or mitigate initiation of degradation mechanisms or to reduce rates of degradation. These secondary-side chemistry controls are implemented as part of the VEGP Water Chemistry Control Program (Appendix B.3.28).

Parameters Monitored/ Inspected

The Steam Generator Program for Upper Internals includes inspection activities intended to detect degradation of secondary side internals needed to maintain tubing integrity and accomplishment of the steam generator intended functions. An assessment based upon steam generator design, potential degradation mechanisms, and related VEGP and industry operating experience is performed to establish inspection requirements for secondary side internals components. The resulting inspection requirements are incorporated into the steam generator inspection plans.

Detection of Aging Effects

Steam generator tubing eddy current testing data provides some indication of secondary-side conditions (e.g., evidence of loose parts). However, detection of aging effects in the steam generator secondary-side internals is primarily accomplished through the use of visual inspections. Industry and VEGP-specific operating experience resulting from prior inspections and cleaning activities (e.g., sludge lancing, sludge collector cleaning, etc.) is considered in establishing secondary-side inspection requirements.

Inspection of steam generator secondary-side components is performed as needed to assess conditions or evaluate potential degradation mechanisms. Visual inspections are adequate to detect loss of material and cracking of steam generator internal support structures prior to any detrimental impact on tube integrity. Various tools and techniques are available for visual inspection of secondary side components; however the choice of visual tools and techniques is dependent on the points of interest for the inspection.

Monitoring and Trending

Consistent with NEI 97-06, secondary side steam generator components whose failure could prevent the steam generator from fulfilling its intended safety-related function are monitored. NEI 97-06 states "The monitoring shall include design reviews, an assessment of potential degradation mechanisms, industry experience for applicability, and inspection, as necessary, to ensure degradation of these components does not threaten tube structural integrity and leakage integrity or the ability of the plant to achieve and maintain safe shutdown." Inspection requirements are based upon the results of an assessment that considers steam generator design, potential degradation mechanisms, and related VEGP and industry operating experience. Inspection results are documented and, when applicable, trends are used to alter the inspection requirements for subsequent inspections.

Acceptance Criteria

Acceptance criteria for inspections of secondary side components are based on the inspection method and engineering evaluation. Visual inspections typically use qualitative criteria for identifying degradation sufficient to warrant further evaluation. Further evaluation may involve additional inspection and engineering evaluation to quantify the extent of degradation (e.g., ultrasonic testing to determine actual wall thickness and engineering evaluation to compare the results to the design requirements). Corrective actions can include follow-up inspections to assess the rate of degradation, repair/replacement of the degraded component, or other actions as deemed appropriate. Any rate of degradation that could potentially result in a loss of steam generator tube integrity or loss of intended function prior to the next scheduled inspection is unacceptable.

When inspection results do not satisfy established acceptance criteria, corrective actions are initiated. The VEGP corrective actions program is consistent with the corrective actions described in Branch Technical Position RLSB-1 in Appendix A.1 of NUREG-1800, Rev. 1 and 10 CFR Part 50, Appendix B.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

The program incorporates new industry operating experience and research data to periodically improve the program. EPRI steam generator guidelines forming the technical basis for the program are the result of a consensus process and are periodically updated by EPRI. The VEGP Steam Generator Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews and assessments are performed.

Review of recent VEGP Steam Generator Program performance results show that the program has been effective in finding and correcting degradation attributable to aging effects requiring management. In the Unit 1 SG upper internals inspection performed in 2000, minor degradation was observed on the feedwater distribution assembly and on one primary moisture separator assembly. In the Unit 2 SG upper internals inspection performed in 2002, minor degradation was observed on the feedwater distribution assembly. In 2004, an extensive engineering review of the VEGP SG secondary side conditions and associated inspection requirements was performed. The review considered the 2000 and 2002 observations, and concluded that the degradation was minor and was insignificant when compared to industry experience.

Enhancements

None

Conclusion

Implementation of the Steam Generator Program for Upper Internals provides reasonable assurance that the steam generator secondary-side upper internals components are adequately managed such that the intended functions of the affected components will be maintained consistent with the CLB during the period of extended operation.

B.3.28 WATER CHEMISTRY CONTROL PROGRAM

Program Description

The VEGP Water Chemistry Control Program is an existing program that mitigates loss of material, cracking, and reduction in heat transfer in system components and structures through the control of water chemistry. The program includes control of detrimental chemical species and the addition of chemical agents.

The VEGP Water Chemistry Control Program is based on the EPRI water chemistry guidelines for primary and secondary water chemistry control. Currently, the VEGP Water Chemistry Control Program is based on:

> *Pressurized Water Reactor Primary Water Chemistry Guidelines: Volumes 1 and 2, Revision 5*, EPRI, Palo Alto, CA , 2003. 1002884 and
>
> *Pressurized Water Reactor Secondary Water Chemistry Guidelines, Revision 6*, EPRI, Palo Alto, CA, 2004. 1008224.

The VEGP Water Chemistry Control Program is updated as revisions to the EPRI guidelines are released.

The One-Time Inspection Program (Appendix B.3.17) includes inspections planned to verify the effectiveness of the Water Chemistry Control Program.

NUREG-1801 Consistency

The VEGP Water Chemistry Control Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.M2, “Water Chemistry.”

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The VEGP Water Chemistry Control Program is based upon EPRI water chemistry guidelines. The EPRI guidelines have been developed based on plant experience, research data, and expert opinion. These guidelines are periodically updated and improved by the industry using a consensus process.

On the primary side, VEGP has experienced increased silica concentrations in the spent fuel pool due to the leaching of silica from the Boraflex spent fuel racks. Silica cannot be removed by ion exchange. VEGP monitors silica concentrations in the spent fuel pool and uses reverse osmosis as needed to remove lower silica concentrations. Silica is not considered to have a significant impact on the structural integrity of passive components and is included only as a diagnostic parameter in the EPRI Pressurized Water Reactor Primary Water Chemistry Guidelines. In 1998 additional spent fuel racks were added to the Unit 1 pool. These new racks do not contain Boraflex, but instead use Boral. Aluminum concentrations in the spent fuel pool water have increased since the introduction of these racks, but the resulting concentrations have not resulted in any significant problems. Ion exchange is effective in controlling Aluminum.

On the secondary side, VEGP has experienced inleakage (e.g., condenser tube leaks, etc.) from the cooling water side that have resulted in plant operation at higher than desirable sodium concentrations at times. In 2002, an inadvertent addition of sodium hexametaphosphate to the condensate chemical feed tanks on both units occurred. This error resulted in exceeding the action level 3 limits for sodium in the steam generators. Both units were immediately shut down in order to reduce the high sodium and phosphate concentrations. While the sodium was effectively removed using fill and drain processes, significant phosphate residuals remained trapped in the steam generator due to interaction with steam generator internal surfaces and sludge. Small but significant phosphate levels return from hideout during start-ups. As a result, the VEGP Water Chemistry Control Program was modified to include phosphate action levels and molar ratio control was terminated. During the last refueling outage for each VEGP unit, chemical cleaning of the secondary side of the steam generators was performed, removing approximately 7000 pounds of scale deposit from Unit 1 and 5000 pounds from Unit 2. Based on the removal of scale deposit and associated adsorbed phosphate, SNC is monitoring plant chemistry parameters to determine the best time to re-initiate molar ratio control.

Recent chemistry control improvements include the replacement of the primary and secondary water treatment plants in 2003 with modern treatment components including ultra-filtration, reverse osmosis, catalytic oxygen removal, and final polishing through virgin resin.

Conclusion

Continued implementation of the VEGP Water Chemistry Control Program provides reasonable assurance that the applicable aging effects in primary and secondary system components will be managed during the period of extended operation.

B.3.29 10 CFR 50 APPENDIX J PROGRAM

Program Description

The 10 CFR 50 Appendix J Program is an existing performance based testing program. The program monitors leakage rates through the containment pressure boundary, including penetrations and access openings. Containment leak rate tests assure that leakage through the primary containment, and systems and components penetrating primary containment does not exceed the allowable leakage limits specified within the VEGP Technical Specifications. Corrective actions are taken if leakage rates exceed established administrative limits for individual penetrations or the overall containment pressure boundary. Seals, gaskets, and bolted connections are also monitored under the program.

The VEGP 10 CFR 50 Appendix J Program utilizes the performance-based approach of 10 CFR 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors" Option B, and includes appropriate guidance form Regulatory Guide 1.163, Revision 0, "Performance-Based Containment Leak-Test Program," together with 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.”

Type A tests are conducted to measure the containment overall integrated leakage rate. Procedures require a general visual inspection of the accessible interior and exterior surfaces of the primary containment and components prior to each integrated leak rate test pressurization. In addition, visual examinations of containment, as described in Regulatory Guide 1.163, are performed in the period between Type A tests. The next Type A test is scheduled to be performed in the year of 2017 for Unit 1, and 2010 for Unit 2 (at a 15 year interval from the previous test).

Type B local leak rate tests are performed on containment pressure boundary access penetrations at frequencies that comply with the requirements of 10 CFR 50 Appendix J Option B. The Type B Test is a test intended to detect or measure leakage across pressure retaining or leakage-limiting boundaries other than valves.

Type C local leak rate tests are performed on containment isolation valves at frequencies that comply with the requirements of 10 CFR 50 Appendix J, Option B.

NUREG-1801 Consistency

The 10 CFR 50, Appendix J Program is an existing program that is consistent with the program described in NUREG-1801, Section XI.S4, “10 CFR 50, Appendix J.”

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The 10 CFR 50 Appendix J Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews and assessments are performed.

Containment integrated leak rate testing (ILRT) was last performed in March 2002 for Unit 1 (1R10), and in March 1995 for Unit 2 (2R4). Local leak rate testing (LLRT) performed prior to the ILRTs identified some leaks to be repaired prior to the ILRTs. The ILRT test results were satisfactory and in compliance with the Technical Specifications and 10 CFR 50, Appendix J. Based on two consecutive as-found leakage rates of less than 1.0 La (allowable leakage rate), the ILRT test frequency for Unit 1 and Unit 2 is 15 years; 1R20 (Spring 2017) for Unit 1 and 2R14 (Spring 2010) for Unit 2, as previously noted in the program description. In addition, the industry and site operating experience confirms that the LLRTs are effective at identifying and initiating corrective actions for leakage at containment penetrations including the equipment hatch and air locks, and confirming the corrective actions taken.

Conclusion

The 10 CFR Part 50 Appendix J Program has been effective at managing aging effects. The 10 CFR Part 50 Appendix J Program provides reasonable assurance that effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.30 INSERVICE INSPECTION PROGRAM – IWE

Program Description

The VEGP Inservice Inspection (ISI) Program – IWE is an existing plant-specific program. The program is implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI, Subsection IWE.

The ISI Program (IWE) manages aging effects for the containment liners and its integral attachments including connecting penetrations and parts forming the leak tight boundary. The primary inspection method for the ASME Section XI, Subsection IWE Program is periodic visual examination along with limited volumetric examinations utilizing ultrasonic thickness measurements as needed.

In conformance with 10 CFR 50.55a(g)(4)(ii) and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP ISI Program – IWE is updated at the end of each 120 month inspection interval to the latest edition and addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval. The program's 2nd inspection interval ended in May 2007. The VEGP 3rd inservice inspection interval requirements are based on ASME Section XI, 2001 Edition including the 2002 and 2003 Addenda.

Program Scope

The ISI Program – IWE is credited for age managing:

- The metallic liners (including its integral attachments) for the concrete containments
- The penetration sleeves including the personnel airlocks, emergency airlocks, and equipment hatches,
- The pressure retaining bolted connections within the boundary of the concrete containment vessels,
- The seals, gaskets, and moisture barriers

Preventive Actions

The ISI Program – IWE is a condition monitoring program that does not include preventive actions.

Parameters Monitored or Inspected

The primary containment and its attachments are inspected for evidence of cracks, wear, and corrosion. Visual inspections for IWE monitor loss of material of the containment liners and attachments by inspecting the surface for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

Detection of Aging Effects

The ISI Program – IWE manages loss of material and cracking for the primary containment and its integral attachments. The primary inspection method for the primary containment and its integral attachments is visual examination. Visual examinations are performed either directly or remotely with sufficient illumination and resolution suitable for the local environment to assess general conditions that may affect either the containment structural integrity or leak tightness of the pressure retaining component. The program includes augmented ultrasonic exams to measure wall thickness of the containment structure.

Monitoring and Trending

ISI Program inspection frequencies are established for each inspection interval consistent with ASME Section XI as specified in 10 CFR 50.55a(g)(4)(ii). Currently, the VEGP ISI Program – IWE is based on ASME Inservice Inspection Program B (IWA-2432).

Results are compared, as appropriate, to baseline data and other previous test results. Indications are evaluated in accordance with ASME Section XI. If the component is qualified as acceptable for continued service, the area containing the indication is reexamined during subsequent inspection periods. Examinations that reveal indications that exceed the acceptance standards are extended to include additional examinations in accordance with ASME Section XI.

Acceptance Criteria

A pre-service, or baseline, inspection of program components was performed prior to startup to assure freedom from defects greater than code-allowable. Results of inservice inspections are compared, as appropriate, to baseline data, other previous test results, and acceptance criteria of the ASME Section XI acceptance standards.

ISI Program – IWE acceptance standards are defined in ASME Section XI, Article IWE-3000, as applicable.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

ASME Section XI, Subsection IWE, states that components whose examination results indicate flaws or areas of degradation that do not meet the acceptance standards are acceptable if an engineering evaluation indicates that the flaw or area of degradation is nonstructural in nature or has no effect on the structural integrity of the containment. Except as permitted by 10 CFR 50.55a(b)(ix)(D), components that do not meet the acceptance standards are subject to additional examination requirements, and the components are repaired or replaced to the extent necessary to meet the acceptance standards.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

The VEGP Inservice Inspection Program – IWE is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. The ASME Boiler and Pressure Vessel Code Section XI is a consensus document that is periodically revised to reflect updated guidance based in part on industry operating experience. The VEGP ISI Program – IWE is upgraded based upon industry and plant-specific experience. Additionally, plant operating experiences are shared among the staffs of all three SNC plant sites and corporate office.

In 2004 during 2R10, corrosion on the containment liner plate was detected at a few locations during an IWE inspection and entered into the Corrective Action Program. Some corrosion locations were repaired. Most of the corrosion on the containment liner plate was evaluated to be cosmetic in nature requiring no repairs.

In 2006 during 1R13, surface rust anomalies on the Unit 1 containment liner plate were identified during IWE visual inspections and entered into the Corrective Action Program. Recoating of the surface has been recommended and action Item has been generated to track the completion.

Industry and site operating experience demonstrates the program is effective at detecting and managing aging effects such that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation.

Enhancements

None

Conclusion

Continued implementation of the VEGP Inservice Inspection Program –IWE provides reasonable assurance that the aging effects will be managed such that the systems and components crediting the program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.31 INSERVICE INSPECTION PROGRAM – IWL

Program Description

The VEGP Inservice Inspection (ISI) Program - IWL is an existing plant-specific program. The program is implemented in accordance with 10 CFR 50.55(a), which imposes the inservice inspection requirements of ASME Section XI, Subsection IWL, for Class CC components. The program manages the reinforced concrete and unbonded post-tensioning systems of the Containment structures.

In conformance with 10 CFR 50.55a(g)(4)(ii) and as based on ASME Inservice Inspection Program B (IWA-2432), the VEGP ISI Program - IWL is updated at the end of each 120 month inspection interval to the latest edition and addenda of the Code specified in 10 CFR 50.55a twelve months before the start of the inspection interval. The program's 2nd inspection interval ended in May 2007. The VEGP 3rd inservice inspection interval requirements are based on ASME Code, Section XI, 2001 Edition including the 2002 and 2003 Addenda.

Program Scope

The Inservice Inspection (ISI) Program - IWL, under ASME Section XI, Subsection IWL, manages reinforced concrete and unbonded post-tensioning systems of Class CC containment. The primary containment is a prestressed concrete post tensioned containment system. The code of construction for the containment structure is the ASME Section III, 1977 Edition.

The following ASME Section XI inspection categories are credited for VEGP license renewal:

All VEGP applicable IWL examination categories L-A and L-B.

Preventive Actions

The Inservice Inspection (ISI) Program - IWL is a monitoring program that does not include preventive actions.

Parameters Monitored/Inspected

The primary containment concrete surfaces and concrete surfaces surrounding tendon anchorages are examined for evidence of damage or degradation, such as concrete cracks. Tendon anchorages and wires are visually examined for cracks, corrosion, and mechanical damage in addition to testing for yield strength, ultimate tensile strength and elongation. Tendon corrosion protection medium is analyzed for alkalinity, water content, and soluble ion concentration.

Detection of Aging Effects

VEGP performs containment concrete, tendon end anchorage and post-tensioning system inspections at 5 year intervals as specified in IWL-2400. The entire accessible concrete surface and all accessible tendon end anchorage areas are examined during each inspection. Regarding detection methods for aging effects, all concrete surfaces receive a visual VT-3C examination. Selected areas, such as those that indicate suspect conditions and areas surrounding tendon anchorages, receive a more rigorous VT-1 or VT-1C examination.

The loss of tendon wire prestressing forces is detected by performance of the tendon inspections and analyses conducted per plant procedures and surveillance tests. In the case of tendons, only samples of the tendons of each tendon type are selected on a random basis for examination at each inspection. The minimum number of each tendon type selected for inspection varies from 2 to 4%. Prestressing forces in sample tendons are measured. In addition, one sample tendon of each type is detensioned. A single wire or strand is removed from each detensioned tendon for examination and testing.

These visual examination methods and testing will identify the aging effects of accessible concrete components and prestressing systems in concrete containments before they compromise the design basis requirements.

Monitoring and Trending

Results are compared, as appropriate, to baseline data and other previous test results. Except in inaccessible areas, all concrete surfaces are monitored on a regular basis by virtue of the examination requirements. Trending of prestressing forces in tendons is performed in accordance with 10 CFR 50.55a and ASME Section XI, Subsection IWL. The prestressing forces in all inspection sample tendons are measured by lift-off tests and compared with acceptance standards based on the predicted force for that type of tendon over its life.

Acceptance Criteria

Results are compared, as appropriate, to baseline data, other previous test results, and acceptance criteria of the ASME Section XI, Subsection IWL, for evaluation of any evidence of degradation. The acceptance criteria are qualitative; guidance is provided in IWL-2510, and in references such as ACI 201.1R and ACI 349.3R for identification of concrete degradation. The predicted tendon forces are calculated in accordance with IWL and Regulatory Guide 1.35.1, which provides an acceptable methodology for use through the period of extended operation.

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

ASME Section XI, Subsection IWL, specifies that items for which examination results do not meet the acceptance standards are to be evaluated in accordance with IWL-3300, "Evaluation" and described in an engineering evaluation report. The report is to include an evaluation of whether the concrete containment is acceptable without repair of the item and if repair is required, the extent, method, and completion date of the repair or replacement. The report also identifies the cause of the condition and the extent, nature, and frequency of additional examinations. Subsection IWL also provides repair procedures to follow in IWL-4000. This includes requirements for the concrete repair, repair of reinforcing steel, and repair of the post-tensioning system.

Confirmation Process

This attribute is addressed by the VEGP Quality Assurance Program (Appendix B.1.3).

Administrative Controls

This attribute is addressed by the VEGP Quality Assurance Program (Appendix B.1.3).

Operating Experience

The VEGP Inservice Inspection Program - IWL is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. The ASME Boiler and Pressure Vessel Code Section XI is a consensus document that is periodically revised to reflect updated guidance based in part on industry operating experience. The VEGP ISI Program - IWL is upgraded based upon industry and plant-specific experience. Additionally, plant operating experiences are shared among the staffs of all three SNC plant sites and the corporate office.

During the VEGP ISI Program - IWL for the Containment Buildings, many cracks were observed and documented, which is typical in prestressed and reinforced concrete structures. The inspection identified some cracks with width near or exceeding the acceptable thresholds; however, the responsible engineer’s review has determined that all of these are of no structural significance.

Indications of staining, cracking, exposed aggregate, and spalling were identified. These indications were characterized as minor. No signs of corrosion in the cracks were noted. The spalling was noted as acceptable because the condition did not have any effect on the structural integrity. No active degradation was noted and the structural integrity of the containment structure was not affected.

Industry and site operating experience demonstrates the program is effective at detecting and managing aging effects such that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation.

Enhancements

None

Conclusion

Continued implementation of the VEGP Inservice Inspection Program - IWL provides reasonable assurance that the aging effects will be managed such that the systems and components crediting the program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

B.3.32 STRUCTURAL MONITORING PROGRAM

Program Description

The VEGP Structural Monitoring Program (SMP) is an existing program based upon the requirements and guidance set forth in 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" and Regulatory Guide 1.160, Rev. 2, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." VEGP uses the SMP to monitor the condition of structures and structural components within the scope of the Maintenance Rule, thereby providing reasonable assurance that that there is no loss of structure or structural component intended function.

Enhancements to the VEGP Structural Monitoring Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Structural Monitoring Program is consistent with the attributes described in NUREG-1801, Section XI.S6, "Structures Monitoring Program," with enhancements.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
1. Program Scope	The scope of the Structural Monitoring Program will be expanded to include the additional structures that require monitoring for license renewal. (1)
1. Program Scope	The scope of inspection for structures that require monitoring for license renewal will be clarified. An area-based inspection will be performed unless a detailed inspection scope is provided. (2)
1. Program Scope	The Structural Monitoring Program scope for hangers and supports will be clarified. (3)

Elements Affected	Enhancement
3. Parameters Monitored or Inspected 5. Monitoring and Trending 6. Acceptance Criteria	The Structural Monitoring Program will be enhanced to include periodic ground water monitoring to confirm it remains non-aggressive as defined in NUREG 1801. (4)
1. Program Scope 3. Parameters Monitored or Inspected 6. Acceptance Criteria	Underwater inspection of the NSCW cooling tower basins, including appropriate inspection and acceptance criteria, will be added to the Structural Monitoring Program.

(1) The additional structures that require monitoring for license renewal during the period of extended operation are:
- Alternate Radwaste Building
- Dry Active Waste (DAW) Warehouse
- DAW Processing Facility
- Radwaste Process Facility
- Radwaste Transfer Building
- Radwaste Transfer Tunnel (Portion near Auxiliary Building only)
- Fire Water Pump House (including Diesel Storage Tank Support Structure)
- Fire Protection Valve House
- Fire Water Storage Tank Structure
- Valve Boxes and Pull Boxes

(2) The area-based inspections will include the structure and structural components, including foundations, hangers and supports (both safety-related and nonsafety-related), etc.

(3) Nonsafety-related as well as safety-related hangers and supports are to be inspected for license renewal. The program document currently indicates only Category 1 hangers and supports.

(4) Periodic ground water monitoring samples will be obtained from locations near the power block structures. Samples will be monitored and evaluated for sulfates, chlorides, and pH; phosphate levels will also be measured.

Operating Experience

The VEGP Structural Monitoring Program is implemented and maintained in accordance with the general requirements for engineering programs. The program is reviewed to ensure compliance with regulatory, process, and procedural requirements. Periodic program reviews are performed.

The baseline inspections conducted in 1998 established a reference condition for comparison during future inspections. Periodic inspections commenced in April 2000 and are planned every 10 years for the duration of plant operation.

During the 1998 Structural Monitoring Program baseline inspections, the condition of the emergency diesel generator exhaust enclosure was found to be unacceptable. The condition was evaluated and entered into the Corrective Action Program resulting in replacement with an improved design.

During periodic inspections conducted in 2005, the rooms/areas inspected were found structurally acceptable with only a few items noted as “acceptable with deficiency.” The deficient conditions were entered into the Corrective Action Program and the monitoring frequency increased. An example of an “acceptable with deficiency” condition is evidence of slight water intrusion on the north wall and floor of Auxiliary Building level C. None of the deficient items required immediate action to maintain the intended functions, and the items will continue to be monitored for any change in condition.

The operating experience review has concluded that administrative controls are in effect and effective in identifying age related degradation and initiating corrective action.

Conclusion

The continuation of the existing VEGP Structural Monitoring Program inspections and reporting, together with the enhancements of the program prior to the period of extended operation, will provide reasonable assurance that the applicable structures and components will continue to perform their intended function(s) during the period of extended operation.

B.3.33 STRUCTURAL MONITORING PROGRAM – MASONRY WALLS

Program Description

The Structural Monitoring Program - Masonry Walls is part of the VEGP Structural Monitoring Program that implements structures monitoring requirements as specified by 10 CFR 50.65. The Masonry Wall Program is an existing program that manages aging of masonry walls, and structural steel restraint systems of the masonry walls, within scope of license renewal. The program includes the concrete masonry units and restraint systems used to seal and provide radiation shielding of some access openings in the Seismic Category 1 structures.

At VEGP, there are no masonry walls in Seismic Category I structures. However, certain access openings in the Auxiliary Building are sealed with concrete masonry units for radiation shielding and maintenance purposes. These concrete units are held captive in place by structural elements such as steel angle or steel beams.

The Turbine Building, the Switch House located in the High Voltage Switchyard, the Dry Active Waste (DAW) Warehouse, DAW Processing Facility, Radwaste Process Facility, Radwaste Transfer Building, and the Fire Water Pump Houses are Non-Category I structures that utilize masonry walls.

The 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 establish examination criteria, evaluation requirements, and acceptance criteria. The program 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 Structural Monitoring Program - Masonry Walls will be enhanced prior to the period of extended operation.

NUREG-1801 Consistency

The Structural Monitoring Program – Masonry Walls, as part of the Structural Monitoring Program, is consistent with the program described in NUREG-1801, Section XI.S5, “Masonry Wall Program”.

Exceptions to NUREG-1801

None

Enhancements

The following enhancement will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
1. Program Scope	The scope of the Structural Monitoring Program – Masonry Walls will be expanded to include monitoring of masonry walls in the structures which are in scope for license renewal but are not currently monitored under the program.

Operating Experience

Plant specific operating experience is derived from condition report searches, personnel interviews and SMP inspection report reviews. The Baseline Inspections conducted in 1998 established a reference in time for comparison to future inspections. Periodic inspections commenced in April 2000 and are planned every 10 years for the duration of plant operation.

The operating experience review has concluded that administrative controls are in effect and effective in identifying age related degradation and initiating corrective action.

Conclusion

The continuation of the existing VEGP Structural Monitoring Program – Masonry Wall inspections and reporting, together with the enhancements of the program prior to the period of extended operation, will provide reasonable assurance that the applicable structures and components will continue to perform their intended function(s) during the period of extended operation.

B.3.34 NON-EQ CABLES AND CONNECTIONS PROGRAM

Program Description

The Non-EQ Cables and Connections Program is a new inspection program that will be used to maintain the function of electrical cables and connections which are not subject to the environmental qualification requirements of 10 CFR 50.49, but are exposed to adverse localized environments caused by heat, radiation or moisture. An adverse localized environment is significantly more severe than the service condition for the insulated cable or connection.

The aging effect of concern is “reduced insulation resistance.” This aging effect is caused by degradation of the insulating materials on electrical cables and connections that is visually observable, such as color changes or surface cracking. These visual indications can be used as indicators of degradation.

A representative sample of accessible insulated cables and connections within the scope of license renewal will be visually inspected for cable and connection jacket surface anomalies such as embrittlement, discoloration, and cracking. The technical basis for the sample selections of cables and connections to be inspected will be provided. The scope of this sampling program will include electrical cables and connections in adverse localized environments.

The Non-EQ Cables and Connections Program will be implemented and the first inspection completed prior to the period of extended operation.

NUREG-1801 Consistency

The Non-EQ Cables and Connections Program will be consistent with the program described in 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 Non-EQ Cables and Connections Program is a new program. Accordingly, there is no programmatic history. Industry and plant-specific operating experience will be considered when implementing this program. However, as noted in NUREG-1801, industry operating experience has shown that adverse localized environments caused by heat or radiation for electrical cables and connections may exist next to or above (within three feet of) steam generators, pressurizers, or hot process pipes such as feedwater lines.

The VEGP program is based on the program in NUREG-1801, which in turn is based on industry operating experience. Therefore this program when implemented assures the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.

Conclusion

Implementation of the Non-EQ Cables and Connections Program consistent with the program described above will provide reasonable assurance that electrical cables and connections within the scope of license renewal will continue to perform their intended function through the period of extended operation.

B.3.35 NON-EQ INACCESSIBLE MEDIUM-VOLTAGE CABLES PROGRAM

Program Description

The Non-EQ Inaccessible Medium-Voltage Cables Program is a new program that manages the aging effects for inaccessible medium-voltage cables (cables with operating voltage from 2kV to 35kV) in the scope of license renewal exposed to significant moisture and significant voltage. The aging effect of concern is "localized damage and breakdown of insulation." The program includes periodic inspection and removal of water accumulation in cable manholes, and periodic cable testing.

Manholes which retain water and contain medium-voltage cables in the scope of license renewal are periodically inspected for water collection and the accumulated water removed, as needed. The frequency of inspection is based on actual plant experience but is at least once every two years.

In-scope medium-voltage cables exposed to significant moisture and voltage are tested at least once every ten years to provide an indication of the condition of the conductor insulation. The specific test performed is a proven test for detecting deterioration of the insulation system due to wetting.

The Non-EQ Inaccessible Medium-Voltage Cables Program will be implemented and the first inspections completed prior to the period of extended operation.

NUREG-1801 Consistency

The Non-EQ Inaccessible Medium-Voltage Cables Program will be consistent with the program described in 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

None

Operating Experience

This is a new program. Accordingly, there is no programmatic history. However, as noted in NUREG-1801, industry operating experience has shown that medium-voltage cables that are simultaneously exposed to significant moisture and significant voltage are susceptible to water tree formation. The formation and growth of water trees varies directly with operating voltage. Treeing is much less prevalent in 4kV cables than those operated at higher voltages. Also, minimizing exposure to moisture minimizes the potential for the development of water treeing.

Conclusion

Implementation of the Non-EQ Inaccessible Medium-Voltage Cables Program consistent with the commitments described above will provide reasonable assurance that medium-voltage cables within the scope of license renewal will continue to perform their intended function through the period of extended operation.

B.3.36 NON-EQ CABLE CONNECTIONS ONE-TIME INSPECTION PROGRAM

Program Description

The Non-EQ Cable Connections One-Time Inspection Program is a new program that will perform one-time inspections on a sample of bolted connections in the scope of license renewal to confirm that loosening of electrical connections is not an aging effect requiring additional aging management during the period of extended operation. The program inspects for loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

The factors considered for sample selection are application (medium and low voltage, defined as <35kV), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.). The technical basis for the sample selections will be documented. Inspection methods may include thermography, contact resistance testing, or other appropriate methods including visual inspection based on plant configuration and industry guidance.

The inspections will be performed within a window of five years immediately preceding the period of extended operation for the first unit (Unit 1). If an unacceptable condition or situation is identified in the selected sample, the Corrective Action Program will be used to evaluate the condition and determine appropriate correction action.

The Non-EQ Cable Connections One-Time Inspection Program provide additional assurance that electrical cable connections will perform their intended function for the period of extended operation. This plant-specific aging management program has been developed as an alternative to the program described in NUREG-1801, Section XI.E6.

The inspections will be performed within a window of ten years immediately preceding the period of extended operation.

Program Scope

The scope of this program is defined as the Non-EQ connections associated with cables in the scope of license renewal.

Cable connections are used to connect cable conductors to other cables or electrical devices. Connections associated with cables within the scope of license renewal are considered in the sample set for this program. Most connections involve insulating material and metallic parts. This aging management program for electrical cable connections (metallic parts) accounts for loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation.

Circuits exposed to appreciable ohmic or ambient heating during operation may experience loosening related to repeat cycling of connected loads or cycling of the ambient temperature. Cable connections may loosen if subjected to significant thermally induced cyclic stress. The design of these connections accounts for the stresses associated with ohmic heating and thermal cycling. Therefore, these stressors should not be a significant aging issue. However, confirmation of the lack of aging effects is warranted.

Preventive Actions

This Non-EQ Cable Connections One-Time Inspection Program is a condition monitoring program; therefore, no actions are taken as part of this program to prevent or mitigate aging degradation.

Parameters Monitored or Inspected

This program will focus on the metallic parts of the cable connections. The one-time inspection verifies that loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation is not an aging effect that requires a periodic aging management program. Parameters inspected are dependent on the detection method used (see *Detection of Aging Effects* below).

Detection of Aging Effects

A representative sample of electrical connections within the scope of license renewal and subject to aging management review will be inspected or tested within a window of five years immediately preceding the period of extended operation of the first unit (VEGP Unit 1) to confirm there are no aging effects requiring management during the period of extended operation. The factors considered for sample selection will be application (medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.). The technical basis for the sample selection will be documented.

Inspection methods may include thermography, contact resistance testing, or other appropriate methods including visual inspection based on plant configuration and industry guidance. The one-time inspection provides additional confirmation to support industry operating experience that shows electrical connections have not experienced a high degree of failures, and that the existing installation and maintenance practices are effective.

Monitoring and Trending

Trending actions are not included as part of this program because this is a one-time inspection program.

Acceptance Criteria

The acceptance criteria for each inspection/surveillance are defined by the specific type of inspection or test performed for the specific type of cable connection. Acceptance criteria will be selected to be indicative of a loose connection (e.g., higher than normal temperature at the connection, high resistance, observed looseness, etc.)

Corrective Actions

This attribute is discussed in Appendix B.1.3. If acceptance criteria are not met, the condition is entered into the corrective actions process.

Confirmation Process

This attribute is discussed in Appendix B.1.3

Administrative Controls

This attribute is discussed in Appendix B.1.3

Operating Experience

The Non-EQ Cable Connections One-Time Inspection Program is a new program. Accordingly, there is no programmatic history. However, as noted in NUREG-1801, industry operating experience has shown that loosening of connections and corrosion of connections could be a problem without proper installation and maintenance activities. Industry operating experience supports performing this one-time inspection program in lieu of a periodic testing program. This one-time inspection program will confirm that the installation and maintenance activities are effective.

Plant and industry operating experience were considered when this program was developed. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801, Section XI.E6, program description. VEGP plant-specific operating experience is consistent with the operating experience in the NUREG-1801, Section XI.E6, program description.

Conclusion

Implementation of the Non-EQ Cable Connections One-Time Inspection Program consistent with the commitments described above will provide reasonable assurance that electrical cable connections within the scope of license renewal will continue to perform their intended function through the period of extended operation.

B.3.37 ENVIRONMENTAL QUALIFICATION PROGRAM

Program Description

The Environmental Qualification (EQ) Program is an existing program that implements the requirements of 10 CFR 50.49. The EQ Program has been established to demonstrate that certain electrical components located in harsh plant environments are qualified to perform their safety functions in those harsh environments, consistent with 10 CFR 50.49 requirements. The EQ Program manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations. The program requires action be taken before individual components in the scope of the program exceed their qualified life. Actions taken include replacement on a specified time interval of piece parts or complete components to maintain qualification, and reanalysis.

As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Some aging evaluations for EQ components specify a qualification of at least 40 years and are considered TLAAs for license renewal. The EQ Program ensures that these EQ components are maintained within the bounds of their qualification bases.

EQ Component Reanalysis Attributes

The reanalysis of an aging evaluation for the qualification of components under 10 CFR 50.49(e) is performed on a routine basis as part of the EQ Program. The reanalysis is normally performed to extend the qualification by reducing conservatisms incorporated in the prior evaluation. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. The analysis may have used conservative bounding conditions that can be refined to extend the qualification.

Important attributes of the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, the underlying assumptions, the acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed below.

Analytical Methods: 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 thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40 year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging, a similar approach may be used. Use of actual plant operating history to re-evaluate and establish the normal integrated radiation dose for the 60-year period may also be used. 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 frequently employed for a reanalysis. Temperature data used in an aging evaluation is to be conservative and based on plant design temperatures or on actual plant temperature data. When used, actual plant temperature data can be obtained in several ways, including monitors used for compliance with Technical Specifications, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running). When used, a representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation, or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis are justified on a case-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations may be used for radiation and cyclical aging.

<u>*Underlying Assumptions:*</u> EQ 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 EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.

<u>*Acceptance Criteria and Corrective Actions:*</u> The reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is maintained, replaced, or re-qualified prior to exceeding the period for which the current qualification remains valid. The reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or re-qualify the component if the reanalysis is unsuccessful).

NUREG-1801 Consistency

The Environmental Qualification Program is an existing program that was established to meet plant commitments for 10 CFR 50.49, and is consistent with NUREG-1801, Section X.E1.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

VEGP has maintained the EQ program since its inception. Program documentation, including the EQ Packages, have been maintained and periodically updated. Routine monitoring of industry OE reports, self-assessments, QA audits and the corrective actions process assure that the EQ Program continues to improve and maintains the VEGP EQ equipment in a qualified condition.

The last EQ Program Team Self Assessment was held in June of 2005. During the assessment an equipment walk down was performed. Two EQ Rosemount transmitters were identified with their electronic head rotated indicating that the moisture seal may have been damaged or degraded. The remaining EQ Rosemount transmitters were inspected for rotated heads and 8 were replaced. Warnings about rotating the electronic head were placed in the Central File and plant procedure.

A 10 CFR Part 21 notice was recently issued on the potential for Barton transmitters to have a bare conductor outside of its seal plug or potting compound. This issue has been addressed at VEGP by adding a qualified environmental seal for the Barton transmitters.

Data Loggers have been used to monitor actual temperatures for many rooms of the plant. Hot spots have historically been identified and resulted in reanalysis and appropriate reductions of the component's qualified life. Additional data collection is proposed when needed to monitor for temperature changes due to plant changes.

Experienced employees, annual training, industry involvement (NUGEQ, NUOG, & IEEE Working Groups), routine monitoring of OE reports, self-assessments, central file maintenance process improvements, QA audits and the associated condition reports assure that the EQ equipment is maintained in a qualified condition.

Conclusion

The continued implementation of the Environmental Qualification Program provides reasonable assurance that the aging effects will be managed and that the components within the scope of the program will continue to perform their intended function(s) for the period of extended operation.

B.3.38 FATIGUE MONITORING PROGRAM

Program Description

The VEGP Fatigue Monitoring Program consists of two existing programs, which are the Fatigue and Cycle Monitoring Program and Thermal Stratification Data Collection. The Fatigue and Cycle Monitoring Program, also known as the VEGP Component or Cyclic Transient Limit Program (CCTLP), is described in VEGP Technical Specifications, Section 5.5.5. This program provides controls to track the cyclic or transient occurrences to ensure that components are maintained within the design limit. The component cyclic or transient limits are provided in VEGP UFSAR Section 3.9.N.1. The Thermal Stratification Data Collection program monitors for adverse thermal stratification and cycling resulting from isolation valve leakage in the normally stagnant non-isolable RCS branch lines identified in the VEGP response to IEB 88-08.

The Fatigue Monitoring Program is used to monitor fatigue for VEGP ASME Class 1 components. The program uses fatigue monitoring software (FatiguePro™ software) that includes three different software modules: cycle counting, cycle-based fatigue monitoring (CBF), and stress-based fatigue (SBF) monitoring.

> *Cycle Counting* – The cycle counting module counts and tracks the number of selected design transients that have occurred. Counting these cycles and demonstrating that current and projected cycles are less than were assumed in design fatigue calculations, demonstrates that those calculations are still valid and therefore the fatigue usage can be expected to remain below the ASME Section III design limit.
>
> *Cycle Based Fatigue (CBF) Monitoring* – The CBF monitoring module computes resulting CUF on a per event basis for each event that actually occurs using the design basis severity for each event specific to the monitored location.
>
> *Stress-Based Fatigue (SBF) Monitoring* – The SBF monitoring module is the most precise means of the three modules for monitoring fatigue usage. This module uses the actual temperature, pressure, and flow measurement data to calculate stress ranges and the resulting fatigue at a given location.

Current and projected fatigue usage is calculated to demonstrate the fatigue usage is, and will continue to be, below the design limit.

The transients and components that are required to be monitored by the UFSAR are based on the following methodology (projections are based on a 60-year operating period):

- The Class 1 components to be monitored are determined by comparing both the design fatigue usage and the projected fatigue usage for the component to a screening value of cumulative usage fatigue (CUF) < 0.1.
- The plant cycles to be monitored are determined by evaluation of the contribution of the lifetime projected plant cycles to the fatigue usage for any Class 1 component, as well as a screening level for the lifetime projected plant cycles of approximately 10% of the design allowable cycles.
- Fatigue monitoring (e.g., SBF monitoring) of the limiting component(s) affected by a cycle may be used to show that the ASME Code acceptance criteria of CUF ≤ 1.0 remains valid even if the assumed number of cycles has been exceeded.
- The screening levels were selected to accommodate the maximum anticipated effect of reactor water environmental factors for a projected 60-year operating period.

The UFSAR requires fatigue monitoring of specific components on each unit and monitoring of specific plant cycles. Monitored cycles and components, and the fatigue monitoring module used are detailed in the metal fatigue TLAA discussion in Section 4.3.1.

The VEGP Fatigue Monitoring Program uses a combination of cycle counting, cycle-based fatigue monitoring, and stress-based fatigue monitoring to monitor and track fatigue usage. The software counts cycles and calculates fatigue usage for selected high usage components. The fatigue monitoring software counts most of the transient cycles that are required to be monitored by monitoring changes in plant instrument readings. Cycles that cannot be counted based on installed instrumentation are counted manually (and then entered into the software). For some specific transients, VEGP uses SBF monitoring of bounding locations in lieu of cycle counting.

VEGP uses SBF monitoring of the main feedwater and auxiliary feedwater nozzles, which are the bounding locations for the feedwater cycling events, rather than count feedwater cycling events. VEGP uses SBF monitoring of the normal and alternate charging nozzles, the bounding locations in the Class 1 portion of the charging and letdown systems, rather than count loss of charging and/or loss of letdown events.

Thermal Fatigue In Normally Stagnant Non-Isolable RCS Branch Lines (IEB 88-08)

In response to IEB 88-08, unisolable sections of piping for the safety injection, normal and alternate charging, and auxiliary spray lines interconnected with the RCS are instrumented to detect adverse thermal stratification and cycling due to potential isolation valve leakage into the RCS boundary. Fluid leakage is detected by temperature measurements utilizing resistance temperature detectors (RTDs) strapped on the pipe. Temperature data is periodically recorded and evaluated for thermal stratification and cycling to determine its impact on piping structural integrity. Additionally (on Unit 2 only), two 12-in. residual heat removal (RHR) suction lines attached to the reactor coolant loop (RCL) hot leg are instrumented with RTDs. This monitoring is currently not performed as part of the fatigue monitoring software.

Thermal Stratification of the Surge Line and Lower Pressurizer (IEB 88-11)

The fatigue monitoring software SBF module calculates the actual amount of fatigue resulting from changes in temperature, pressure, or other parameters that affect the fatigue of the surge line and lower pressurizer and also accounts for insurge/outsurge and thermal stratification effects. Thus, SNC addresses Renewal Applicant Action Item 3.3.1.1.-1 contained in WCAP-14574A for license renewal by using the stress-based monitoring software for the lower pressurizer and surge line nozzles.

Fatigue Monitoring Requirements Due to Environmentally Assisted Fatigue (NUREG/CR-6260)

With respect to environmentally assisted fatigue (EAF) of piping in the reactor coolant pressure boundary, SNC has evaluated this effect for locations equivalent to those in Section 5.4 of NUREG/CR-6260 using the formulas from NUREG/CR-5704 for stainless steel components and from NUREG/CR-6583 for low-alloy steel components. All locations evaluated were shown to be acceptable for 60 years. The cumulative fatigue usage at 4 of these 6 components is tracked in the Fatigue Monitoring Program. The acceptance criteria for cumulative fatigue usage of those components is reduced to account for the Fen value determined in the EAF evaluation. The design CUF of the other two components is low enough that monitoring cycles ensures that the evaluation of EAF remains valid.

The UFSAR does not currently require fatigue monitoring for two of the locations where fatigue monitoring is required or desired to manage environmental fatigue effects during the period of extended operation. These components are currently monitored, but are not currently required to be monitored by the UFSAR. Prior to the period of extended operation, the UFSAR will be changed to indicate that fatigue monitoring is required at these additional locations - the Accumulator/RHR nozzle and the pressurizer heater penetration.

Pressurizer Nozzles Full Structural Weld Overlays

Weld overlays have been installed on the Unit 2 pressurizer spray nozzle, pressurizer safety and relief nozzles, and the pressurizer surge nozzle, and will be installed on the corresponding Unit 1 pressurizer nozzles during the next refueling outage. The cycle counting and cycle-based fatigue modules of the Fatigue Monitoring Program are not affected by this change. However, the effects of the weld overlay on the stress-based module for monitoring the CUF of the spray and surge nozzles is still being evaluated. The weld overlays will be examined as part of the 10 year ISI program.

Impact of Planned Measurement Uncertainty Recapture Power Uprate

SNC expects to submit a license amendment request for a measurement uncertainty recapture power uprate for VEGP in the near future. The number of assumed transients is not expected to change, and the CBF and SBF modules are expected to remain unaffected. Therefore, the Fatigue Monitoring Program should not be materially affected. SNC will notify the NRC as part of the Annual Update (10 CFR 54.21(b)) of any CLB changes that occur and materially affect the license renewal application as part of the Annual Update (10 CFR 54.21(b)).

The enhancements to the Fatigue Monitoring Program will be implemented prior to the period of extended operation.

NUREG-1801 Consistency

The VEGP Fatigue Monitoring Program will be consistent with the program described in NUREG-1801, Section X.M1, “Metal Fatigue of Reactor Coolant Pressure Boundary,” with enhancements.

Exceptions to NUREG-1801

None

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancement
Program Description	The effect of the full structural weld overlays applied to the pressurizer spray and surge nozzles on the stress-based module for monitoring their CUF is still being evaluated. If the existing module is not conservative, the module will be revised so that it continues to provide valid results.
4. Parameters Monitored	The UFSAR will be changed to require fatigue monitoring of the Accumulator/RHR nozzles and of the pressurizer heater penetration. These components are currently monitored but not specified in the UFSAR. These components were evaluated for environmental fatigue effects and monitoring of these components is required or desired for the period of operation.
6. Acceptance Criteria	The implementing procedure for the Fatigue Monitoring Program will be enhanced to reduce the acceptable CUF value to account for environmental fatigue effects for those NUREG-6260 locations monitored for fatigue. The acceptable CUF for those locations will be reduced from the design code limit of 1.0 to 1 divided by the Fen value used for the environmental fatigue evaluation of that location.
7. Corrective Actions	The implementing procedure for the Fatigue Monitoring Program will be enhanced to explicitly require that the corrective actions initiated for exceeding an acceptance criterion include a review to identify and assess any additional affected reactor coolant pressure boundary locations.

Operating Experience

The set of design basis transients was intended to be a conservative estimate of the number, types, and severity of events that could occur during normal and accident conditions. However, actual operating transients are what determine the real fatigue usage on components. Westinghouse PWR plant experience to date indicates that actual operating transients are often fewer in number and less severe than postulated in the design basis.

Industry and plant operating experience were factored into the VEGP Fatigue Monitoring Program when it was established. Existing monitored locations include those that operating experience has shown are likely to accumulate significant fatigue usage at Westinghouse plants. The SNC Operating Experience Program is used to review industry experience, disseminate that information to appropriate SNC personnel (including the engineer responsible for fatigue monitoring), collect site experience, and to disseminate that information to the rest of the industry, when appropriate. The VEGP operating experience demonstrates the ability of the program to monitor cycles and fatigue usage, and to make changes to the program as dictated by operating experience.

Fatigue monitoring software was incorporated into the VEGP Fatigue Monitoring Program in 1995. A Fatigue and Cycle Monitoring Report is prepared every 18 months that provides the current count for cycles requiring monitoring and the current fatigue usage for components that require fatigue monitoring. The report also provides 40 and 60 year projections for both monitored cycles and fatigue usage at monitored components. These reports are reviewed to determine whether any monitored locations require further actions. An example is the case of the feedwater and auxiliary feedwater nozzles which were changed from cycle counting to fatigue calculated monitoring when projected cycles of feedwater cold water slug events exceeded the assumed limit. The charging nozzles are a similar example in which the program was changed to use stress based monitoring based on results of cycle counting.

Conclusion

VEGP has demonstrated the ability to monitor cycles and fatigue usage and manage the program. The program operating experience provides reasonable assurance that the Fatigue Monitoring Program will be effective in managing the effects of aging so that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation.

APPENDIX C Commodity Group Evaluations

(This Appendix is not used).

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APPENDIX D Technical Specification Changes

10 CFR 54.22 requires that an application for license renewal include any technical specification changes or additions necessary to manage the effects of aging during the period of extended operation.

No changes to the VEGP Unit 1 or Unit 2 Technical Specifications are required to support the License Renewal Application.

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