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SECTION 1 ADMINISTRATIVE INFORMATION

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1.0 INTRODUCTION

This License Renewal Application for Joseph M. Farley Nuclear 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 OWNER

Southern Nuclear Operating Company, Inc. (SNC) hereby applies for renewed operating licenses for Joseph M. Farley Nuclear Plant, Units 1 and 2. SNC submits this application individually and as agent for the plant owner and co-licensee, Alabama Power Company.

1.1.2 ADDRESSES OF THE APPLICANT AND OWNER

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

Alabama Power Company
600 North 18th Street
Birmingham, Alabama 35291

1.1.3 DESCRIPTIONS OF THE BUSINESS OR OCCUPATION OF THE APPLICANT AND OWNER

Southern Nuclear Operating Company, Inc.

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

SNC is the exclusive licensed operator of the owner's nuclear facility, FNP, which is the subject of this application. The current Unit 1 license (Facility Operating License No. NPF-2) expires on June 25, 2017 and the current Unit 2 license (Facility Operating License No. NPF-8) expires on March 31, 2021. SNC will be named as the exclusive licensed operator on the renewed operating licenses.

Alabama Power Company

Alabama Power Company (APC) is engaged in the generation and transmission of electricity within the State of Alabama. APC serves more than 1.3 million residential and commercial customers in a service area of approximately 44,500 square miles constituting two-thirds of the State of Alabama's land area. APC's power plants have a total rated capability of over 12,000 MW. APC is the owner and licensee of FNP and will be named as the owner and licensee on the renewed operating licenses.

1.1.4 DESCRIPTIONS OF ORGANIZATION AND MANAGEMENT OF APPLICANT AND OWNER

Southern Nuclear Operating Company

SNC is a wholly-owned subsidiary of 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, Mississippi Power Company, Savannah Electric, and Southern Company Gas. 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 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; Southern Company Energy Solutions, a wholly-owned subsidiary providing non-regulated energy-related products and services; and Southern Power Company, a wholly-owned subsidiary involved in energy marketing and electricity generation in the southeast U.S.

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 36,000 MW as of January 1, 2003.

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 Owner.

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

H. A. Franklin President and Chief Operating Officer Southern Company	270 Peachtree Street Atlanta, Georgia 30303
D. M. Ratcliffe 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 35202
W. G. Hairston, III President & Chief Executive Officer Southern Nuclear Operating Company, Inc.	P.O. Box 1295 Birmingham, Alabama 35201

Principal Officers

W. G. Hairston III, President and CEO, Birmingham, Alabama
J. D. Woodard, Executive Vice President, Birmingham, Alabama
H. L. Sumner, Jr., Vice President, Hatch Project, Birmingham, Alabama
J. B. Beasley, Jr., Vice President, Farley Project, Birmingham, Alabama
J. T. Gasser, Vice President, Vogtle Project, Birmingham, Alabama
L. B. Long, Vice President, Technical Support, Birmingham, Alabama
J. W. Averett, Vice President, Administrative Services, Birmingham, Alabama
J. O. Meier, Vice President and Corporate Counsel, Birmingham, Alabama
K. S. King, Vice President, Comptroller, Treasurer, and CFO, Birmingham, Alabama
J. E. Garlington, Vice President, Engineering, Birmingham, Alabama
S. A. Mitchell, Corporate Secretary, Birmingham, Alabama

ALABAMA POWER COMPANY

The names and business addresses of Alabama Power Company's directors and principal officers are as follows. All directors and principal officers are citizens of the United States with the exception of Mr. Renschler, who is a citizen of Germany.

Directors

W. Armstrong	301 South Edwards Street Enterprise, Alabama 36330
D. J. Cooper	118 N. Royal Street Mobile, Alabama 36607
H. A. Franklin	270 Peachtree Street, NW, Ste. 2200 Atlanta, Georgia 30303
R. K. Henslee	754 Chestnut Street Gadsden, Alabama 35901
C. E. Jones	417 North 20th Street Birmingham, Alabama 35203
P. M. King	1501 S. Quintard Avenue Anniston, Alabama 36201
J. K. Lowder	2000 Interstate Pkwy Drive, Ste. 400 Montgomery, Alabama 36109
C. D. McCrary	600 North 18th Street Birmingham, Alabama 35203
W. D. Malone, Jr.	420 North 20th Street Birmingham, Alabama 35203
M. Mitchell	One Maison Building 3800 Airport Boulevard, Ste. 302 Mobile, Alabama 36616

Directors (cont'd)

Dr. M. Portera	401 Queen City Avenue Tuscaloosa, Alabama 35401
R. D. Powers	P. O. Box 788 Eufaula, Alabama 36072-0788
A. Renschler	Smart GmbH Leibnizstrasse 2 71032 Boeblingen, Germany
C. D. Ritter	1900 5th Avenue North, 14th Floor Birmingham, Alabama 35203
J. H. Sanford	1001 McQueen Smith Road, South Prattville, Alabama 36066
Dr. W. F. Walker	107 Samford Hall Auburn, Alabama 36489-5113
J. C. Webb, IV	125 W. Washington Street Demopolis, Alabama 36732
J. W. Wright	100 Commerce Street Montgomery, Alabama 36104

Principal Officers

C. D. McCrary, President and CEO, Birmingham, Alabama
C. A. Martin, Executive Vice President, Birmingham, Alabama
S. R. Spencer, Executive Vice President, Birmingham, Alabama
W. B. Hutchins, III, Executive Vice President, Birmingham, Alabama
R. O. Mundy, Senior Vice President and Counsel, Birmingham, Alabama
R. Holmes, Jr., Senior Vice President, Birmingham, Alabama
R. A. Hurst, Senior Vice President, Birmingham Alabama
M. L. Scott, Senior Vice President, Birmingham, Alabama
J. L. Stewart, Senior Vice President, Birmingham, Alabama

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 FNP Units 1 and 2 (Facility Operating License Nos. NPF-2 and 8, respectively) for a period of 20 years beyond their current expiration dates (midnight, June 25, 2017 for Unit 1 and midnight, March 31, 2021 for Unit 2.)

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 APC and others for whom expenses are incurred, as appropriate. APC is subject to the jurisdiction of the Alabama Public Service Commission and the Federal Energy Regulatory Commission.

Alabama Public Service Commission
P. O. Box 304260
100 North Union St.
RSA Union, Suite 850
Montgomery, Alabama 36130

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

1.1.9 LOCAL NEWS PUBLICATIONS

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

The Montgomery Advertiser
200 Washington Avenue
Montgomery, AL 36104
(334) 262-1611

The Dothan Eagle
227 N. Oates St.
PO Box 1968
Dothan, AL 36302
(334) 792-3141

The Albany Herald
P.O. Box 48
Albany, GA 31702-0048
(229) 888-9300

Tallahassee Democrat
277 N. Magnolia Drive
Tallahassee, FL 32301-2695.
(850) 599-2100

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 of the term of the proposed renewed license." The original Indemnity Agreement for FNP , which was effective as of July 20, 1976, provides that such agreement "shall terminate at the time of the 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-1647. Since July 20, 1976, however, the Indemnity Agreement has been amended in order to add license numbers NPF-2, SNM-1868, and NPF-8 to Item 3 of the Attachment. As a consequence of these amendments, the existing Indemnity Agreement is presently due to terminate at midnight, March 21, 2021, 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 FNP 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 FSAR 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.

By letter dated July 16, 2003, Southern Nuclear Operating Company (SNC) requested to use a Risk-Informed Inservice Inspection (RI-ISI) Program as an alternative to the FNP Units 1 and 2 ISI Program requirements for ASME Code Category B-F, B-J, C-F-1, and C-F-2 piping. Assuming this program change is approved, SNC will work with NRC to ensure changes to the current licensing basis (CLB) as reflected in this program change will be appropriately incorporated in the Inservice Inspection Program Aging Management Program described in Appendix B.

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. J. B. Beasley, Jr.
Vice President – Farley Project
Southern Nuclear Operating Company
40 Inverness Center Parkway
P. O. Box 1295
Birmingham, AL 35201-1295, with copies to:

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

Mr. C. R. Pierce
Southern Nuclear Operating Company
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 Joseph M. Farley Nuclear Plant, Units 1 and 2. The application contains technical information required by 10 CFR 54.21, technical specification changes 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 JOSEPH M. FARLEY NUCLEAR PLANT

FNP consists of two Westinghouse pressurized water reactor units located about 16.5 miles east of the City of Dothan, in Houston County, Alabama. The nearest public road is State Highway 95, which forms the western boundary of the site property. Each unit is rated at 2775 MWt, with gross electrical output of approximately 910 MWe. The containment for each of the FNP units (designed by Bechtel Power Corporation) consists of a steel lined, prestressed, post-tensioned concrete structure. Each containment houses a nuclear steam supply system (NSSS) consisting of a reactor, steam generators, reactor coolant pumps, pressurizer, and some reactor auxiliaries. The auxiliary buildings house the waste treatment facilities, engineered safeguards system components, switchgear, offices, the control room, spent fuel pool, and new fuel storage facilities. The turbine building houses the turbine generator, condensers, feedwater heaters, condensate and feedwater pumps, and turbine auxiliaries. The emergency diesel generators are housed in the Diesel Generator Building, which is located south of the Unit 1 Auxiliary Building. The service water system takes suction from the Service Water Intake Structure located at the storage pond. This structure is shared between the two units.

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 owner of FNP, 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**. This table identifies all systems 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.

<u>Appendix B</u> – 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. Any major findings resulting from the operating experience review for each program are also discussed.

<u>Appendix C</u> – Commodity Group Evaluations

Appendix C is not used in this application.

<u>Appendix D</u> – 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.

<u>Appendix E</u> – 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.

1.6 DEFINITIONS AND ACRONYMS

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
APC	Alabama Power Company
ART	Adjusted Reference Temperature
AS&CR	Auxiliary Steam and Condensate Recovery
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
BTRS	Boron Thermal Regeneration System
BWR	Boiling Water Reactor
CASS	Cast Austenitic Stainless Steel
CCW	Closed Cooling Water or Component Cooling Water
CET	Core Exit Thermocouple
CF	Chemistry Factor
CLB	Current Licensing Basis
CRDM	Control Rod Drive Mechanism
CR	Condition Report
CRGT	Control Rod Guide Tube
CS	Containment Spray
CST	Condensate Storage Tank
CUF	Cumulative Usage Factor
CVCS	Chemical and Volume Control System
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
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
FNP	Farley Nuclear Plant
FP	Fire Protection
FPP	Fire Protection Plan
FSAR	Final Safety Analysis Report
FSD	Functional System Description
FW	Feedwater
GDC	General Design Criteria
GSI	Generic Safety Issue
HAZ	Heat-Affected Zone
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
MWe	Megawatts Electric
MWt	Megawatts Thermal
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NSR	Non Safety-Related
NSSS	Nuclear Steam Supply System
ODSCC	Outside Diameter Stress Corrosion Cracking
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
RVLIS	Reactor Vessel Level Indicating System
RWST	Refueling Water Storage Tank
SBO	Station Blackout
SCs	Structures and Components
SCC	Stress Corrosion Cracking
SER	Safety Evaluation Report
SFP	Spent Fuel Pool
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
SWIS	Service Water Intake Structure
TLAA	Time-Limited Aging Analysis
TPNS	Total Plant Numbering System

TSP	Trisodium Phosphate
UFSAR	Updated Final Safety Analysis Report
USE	Upper-Shelf Energy
WCAP	Westinghouse Commercial Atomic Power
WOG	Westinghouse Owner's Group

1.7 REFERENCES

1. NUREG-1801, Vol. 1 and 2, "Generic Aging Lessons Learned (GALL) Report," Vol. 1 and 2, April, 2001.

SECTION 2 STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

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2.0 INTRODUCTION

This section describes the process for identifying the structures and components subject to an aging management review. The results of applying the process at FNP also are provided.

The scoping and screening methodology is described in **Section 2.1**. The results of the assessment to identify the systems and structures within the scope of license renewal are contained in **Section 2.2**. The results of the identification of the components and structure components subject to an aging management review are contained in **Section 2.3** for mechanical systems, **Section 2.4** for structures, and in **Section 2.5** for electrical/I&C systems. The information provided in this Chapter 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 process used by SNC to identify FNP Systems, Structures and Components (SSCs) subject to a license renewal aging management review. The FNP License Renewal review methodology follows the approach recommended in NEI 95-10 Rev 3. The process is performed in two steps. "Scoping" refers to the process of identifying all plant systems and structures and the functions performed by those systems and structures to determine those which perform intended functions as defined in 10 CFR 54.4 (a) (1) - (3). "Screening" is the process of determining which components associated with the in-scope systems and structures are subject to an aging management review in accordance with the Individual Plant Assessment (IPA) mandated by 10 CFR 54.21 (a)(1). The scoping and screening process is described in **Section 2.1.3**.

2.1.1 REGULATORY REQUIREMENTS

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

"(a) Plant systems, structures, and components within the scope of this part are-

(1) Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events (as defined in 10 CFR 50.49(b)(1)) to ensure the following functions-

(i) The integrity of the reactor coolant pressure boundary;
(ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
(iii) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in §50.34(a)(1), §50.67(b)(2), or §100.11 of this chapter, as applicable.

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

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

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

2.1.2 INFORMATION SOURCES

The process to identify systems and structures that satisfy the requirements of 10 CFR 54.4 is performed using documents that form the FNP Current Licensing Basis (CLB). The CLB for FNP Units 1 and 2 is consistent with the definition provided in 10 CFR 54.3. The key information sources that form the CLB include the UFSAR, Technical Specifications, and docketed licensing correspondence. SNC selected April 1, 2003 as the date beyond which inclusion of changes would be considered only on a case-by-case basis. CLB documents revised after April 1, 2003 will be included in the annual update required by 10 CFR 54.21(b).

Other information sources utilized in the scoping process include the following:

- <u>Functional System Descriptions</u>

  The Functional System Descriptions (FSDs) document the bases, sources, and functional requirements for FNP systems. The FSDs are controlled documents and are updated periodically.

- <u>Maintenance Rule Scoping</u>

  The Maintenance Rule scoping defines the systems and system functions within the scope of the Maintenance Rule, 10 CFR 50.65. This set of plant functions was used as one of the starting points in the scoping effort.

- <u>Plant Drawings</u>

  Drawings were used in the scoping process for determining SSCs. Drawings such as plant layout and general arrangement drawings, single line drawings and schematics, and piping and instrumentation drawings (P&IDs) were used. P&IDs provide valve, damper, piping, ductwork, instrumentation, and other component information and include ASME Code class or ANS Safety Class designations as described in UFSAR Chapter 3.

- <u>Probabilistic Risk Assessment Model</u>

  The Probabilistic Risk Assessment model was used as one input in the identification of plant functions.

2.1.3 SCOPING PROCEDURE

The FNP scoping process began with development of a comprehensive list of plant functions focused on identifying SSCs as defined by 10 CFR 54(a). Functions are defined as required actions of a system or structure. This preliminary list was compiled by reviewing the UFSAR, licensing correspondence, design basis documents, and design drawings, as applicable.

The preliminary functions were combined or separated as necessary resulting in a final set of plant functions to consider for scoping. Each final plant function was evaluated to the 10 CFR 54.4(a) criteria to determine if it met the definition of an intended function for license renewal. An expert panel was convened to review the list of identified intended functions and the criteria that brought each into the scope of license renewal. The systems and structures that perform each intended function were then identified.

Based on the above, the license renewal intended functions satisfying the criteria of 10 CFR 54.4(a) and the systems and structures that perform those intended functions were identified and are listed in the tables in **Section 2.2**. The sections below provide specific considerations for each of the rule scoping criteria.

2.1.3.1 SR Criteria Pursuant To 10 CFR 54.4(a)(1)

Safety classifications of SSCs were established based on reliance on the SSCs during and following design basis events. The design basis events considered are consistent with the FNP Units 1 and 2 CLBs. The UFSAR, with emphasis on Chapters 15 and 6, provides the design basis event analyses for FNP. Natural phenomena and external events are described in UFSAR Chapter 2. Structures designed to withstand design basis events, natural phenomena, and external events are described in UFSAR Chapter 3.

The SR plant functions (i.e. those that meet the criteria of 10 CFR 54.4 (a)(1)) have been identified from the applicable information sources and are within the scope of license renewal. These functions have been listed in the scoping database. The systems and structures required to perform these SR functions are listed in the scoping database as well as the plant level scoping results in **Tables 2.2-1a through f**.

2.1.3.2 NSR Criteria Pursuant To 10 CFR 54.4(a)(2)

10 CFR 54.4(a)(2) states that SSCs within the scope of license renewal include NSR SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for SR SSCs.

The NSR SSCs that are within the scope of license renewal for FNP Units 1 and 2 fall into two categories:

- NSR SSCs that functionally support the operation of SR SSCs, and
- NSR SSCs whose failure could cause an interaction with safety-related SSCs that could potentially result in the failure of the SR SSCs to perform their intended safety function(s).

Scoping of SSCs for the criteria of 10CFR54.4(a)(2) for FNP considered those failures identified in the CLB and plant-specific operating experience, and any industry-wide operating experience that is specifically applicable to FNP. The scoping of SSCs under the criteria of 10CFR54.4(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. This is consistent with the guidance in NEI 95-10 and Table 2.1-2 of NUREG-1800.

<u>NSR SSCs that functionally support the operation of SR SSCs</u>

Few system and structure functions at FNP satisfied this category because SSCs supporting safety-related systems and structures were typically designed as safety-related. Each system and structure function was reviewed to determine if NSR SSCs functionally supported accomplishment of a SR function.

<u>NSR SSCs whose failure could cause an interaction with safety-related SSCs and potentially result in the failure of the SR SSCs to perform their intended safety function(s)</u>

The identification of SSCs that meet this category of the scoping criteria of 10 CFR 54.4(a)(2) was performed within an engineering discipline (electrical, civil, mechanical) basis.

<u>Electrical/I&C</u>:

Electrical design of FNP incorporates the isolation of SR components from NSR components such that SSCs that could prevent or adversely effect a function that meets the criterion of 10 CFR 54.4(a)(1), are classified SR. Therefore, these components were placed in scope under 10 CFR 54.4(a)(1) rather than under 10 CFR 54.4(a)(2).

<u>Civil/Structural</u>:

NSR civil SSCs that are in proximity to SR civil/mechanical/electrical SSCs and whose failure could inhibit or adversely affect the performance of SR SSCs or SR functions were placed in-scope for aging effects evaluation. A spaces approach was used to scope civil features inside structures housing SR SSCs that could cause an interaction with safety-related SSCs that could potentially result in the failure of the SR SSCs to perform their intended safety function(s). As an example, all supports in a Seismic Category (SC) I building are in scope, whether or not they are SC I, SC II-over-I, or SC II in design.

<u>Mechanical</u>:

SNC used a systematic process to identify mechanical components subject to the 10 CFR 54.4(a)(2) criteria. Five categories of components were established based on a review of FNP's CLB documents, plant and industry operating experience, and considering NRC's guidance on scoping for 10 CFR 54.4(a)(2) including draft ISG-09 (see **Section 2.1.5.9**). A separate method was used for identifying the NSR in-scope components for each category. The five categories of mechanical components that meet 10 CFR 54.4(a)(2) are:

- <u>High Energy NSR piping and Mechanical Components</u>

  The FNP CLB applies the expression "high energy" to those piping systems and components that are normally operated at greater than either 275 psig or 200°F as defined in Section 3.6 and Appendix 3K of the FNP UFSAR. To the extent that NSR high energy piping is located in proximity to SR SSCs, such that a failure of the NSR piping could adversely affect the performance of a SR function, the NSR piping meets the 10 CFR 54.4(a)(2) criteria and was placed in-scope and evaluated for aging effects.

- <u>NSR piping and components attached to SR piping</u>

  NSR piping segments that provide structural support at SR/NSR boundaries functionally support the operation of SR SSCs at FNP. The SR/NSR functional boundaries for piping systems are typically made at system pressure boundary valves.

SNC considers the NSR piping and components attached to SR piping to be in the scope of 10 CFR 54.4(a)(2) to the extent that the NSR piping and components are necessary for the qualification (e.g. seismic loading) of the SR piping. Where a transition occurs from the SR in-scope piping to the NSR piping, SNC considers the NSR components up to the next equivalent seismic anchor (or physical restraint in the third-direction)) to be in the scope of the Rule, and SNC evaluated the components for aging effects requiring management.

- <u>Non-attached NSR piping</u>

  Non-attached low energy NSR piping that is not in-scope due to a regulated event was placed in-scope if it had a spatial relationship with SR SSCs such that if the pressure boundary of the piping failed, the liquid inside could cause the SR SSC to fail.

  The process for identifying non-attached NSR piping and mechanical components involved identifying valid targets and credible threats in a given area of FNP. A valid target is an electrical component that supports a function that is in scope for criterion 10 CFR 54.4(a) (1). To be a valid target, the electrical component must also be vulnerable to the effects of the failure of the mechanical NSR SSC. For the purposes of this process, a credible threat is a mechanical component (predominately piping) that if it failed in a non-hypothetical way would cause its contents to come into contact with an electrical SR SSC. Because SNC used this methodology to identify NSR components that are not already in the scope of the Rule, the mechanical threat must not already be in the scope of LR due to criteria 10 CFR 54.4(a)(1) or 10 CFR 54.4(a)(3). The combination of a credible threat and a valid target creates a need to evaluate the threat for aging effects – thereby bringing the threat into scope for LR.

- <u>Relief paths for SR relief valves and SR pump recirculation lines</u>

  Components in this category are often in-scope for non-regulated events or included in the category of attached NSR piping. However, some relief paths (the paths for the main steam safety vents being an example) are not connected to the safety valves and need to be further evaluated. The focus is on the impact of losing the relief path on the performance of a safety function. If the relief path is assumed to exist for the function to occur, then the relief path was conservatively included in scope. For example, if the plant is not analyzed for a through-wall leak of the relief piping resulting in flooding, high temperature, or pressure, then the relief path is in-scope for 10 CFR 54.4(a)(2).

  Similarly, many SR pumps require a minimum flow path to be functional under low flow conditions. In some cases this piping and the components in the line are classified as NSR for FNP. For the purposes of 10 CFR 54.4(a)(2), the recirculation and minimum flow paths were included in-scope to the extent they are necessary to assure the performance of SR functions.

- <u>NSR Features to Maintain PRF Negative Pressure Envelope</u>

  The Penetration Room Filtration (PRF) System maintains a negative pressure on the room boundary to ensure leakage is into the room and filtered prior to being exhausted. The PRF also provides safety-related ventilation and filtration for the spent fuel pool area. The PRF System filtration functions to limit post-accident radiological releases to the environment. Certain drains in the Auxiliary Building are plugged and certain drain lines are fitted with running traps to ensure that the PRF System can maintain a negative and perform its safety function. The plugs and running traps are NSR. SNC has included the drain plugs and running traps in the scope of renewal and evaluated these components for aging effects that require management. See **Section 2.3.3.19** and **Section 3.3.2.1.19** for further information on these components.

The scoping process to identify NSR systems and structures whose failure can affect SR systems and structures for FNP Units 1 and 2 is consistent with and satisfies the criteria in 10 CFR 54.4(a)(2).

2.1.3.3 Other Scoping Pursuant To 10 CFR 54.4 (a)(3)

10 CFR 54.4(a)(3) states that the scope of license renewal include the SSCs relied on in safety analyses or plant evaluations to demonstrate 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).

Scoping of SSCs for the criteria of 10 CFR 54.4(a)(3) for FNP does not require consideration of hypothetical failures or second-, third, or fourth-level support systems. This methodology 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.

Scoping based on each of these regulations is described in the following sections.

2.1.3.3.1 <u>Fire Protection (FP)</u>

SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with 10 CFR 50.48, "Fire Protection", are within the scope of license renewal.

10 CFR 50.48 dictates that each licensee must have a Fire Protection Plan (FPP) 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 automatic and manually operated fire detection and 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.

Each nuclear station has a unique FP program, and the licensing basis for meeting FP requirements is plant-specific. The FNP plant-specific licensing basis documents applicable to the FNP FP Program, such as the FSAR, SERs, and licensing correspondence, were reviewed to establish the FP scoping determinations. Based on the plant-specific FP CLB, SNC has placed in-scope for license renewal those

SSCs that are relied upon in the event of a fire to maintain the ability to perform (or perform) reactor plant safe shutdown functions, or to minimize radioactive releases to the environment. 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.

The scoping effort performed is consistent with the NRC staff guidance detailed in draft ISG-07 (see discussion in **Section 2.1.5.7**).

2.1.3.3.2 Environmental Qualification (EQ)

Certain SR electrical components are qualified to withstand environmental conditions that may occur during or following a design basis accident per 10 CFR 50.49. For FNP, the EQ Master Lists provide a listing of all electrical equipment needed to meet the requirements of 10 CFR 50.49. They also provide a reference to the environmental qualification package that provides the basis for its qualification.

Components qualified under the requirements of 10 CFR 50.49 are within the scope of license renewal. These components are identified on the EQ Master Lists for both units. TLAAs associated with EQ equipment are discussed in **Section 4.4**.

2.1.3.3.3 Pressurized Thermal Shock (PTS)

“Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events,” (10 CFR 50.61) requires that licensees evaluate the reactor vessel beltline materials against specific criteria to ensure protection against brittle fracture. SSCs relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with this regulation are within the scope of license renewal.

Based upon a review of FNP design basis documentation, only the reactor vessels and internals structures credited to reduce RPV fast neutron fluence are relied upon for protection against pressurized thermal shock. The design calculations associated with pressurized thermal shock have been identified as TLAAs for FNP and are discussed in **Section 4.2.3** of the LRA.

2.1.3.3.4 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 sensor to the final actuation device) from the existing reactor trip system.

FNP Units 1 and 2 utilize a Westinghouse designed AMSAC system that initiates on Low SG water level for compliance with the ATWS Rule. AMSAC provides a diverse backup to the reactor trip system (RTS) for automatically initiating a turbine trip and initiating auxiliary feedwater flow under conditions indicative of an ATWS.

The systems and components that sense, initiate, and perform these required functions are considered to be within the scope of license renewal for ATWS.

2.1.3.3.5 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 FNP, SBO is defined in UFSAR section 8.3.1.1.7.3 as LOSP on both units concurrent with the simultaneous failures of any 3 of the 4 diesel generators: 1-2A, 1C, 1B, and 2B. FNP chose to meet these requirements by utilizing emergency diesel generator 2C (EDG 2C) as an alternate AC (AAC) power source.

In addition to the SSCs required to cope with a SBO event, per NRC Interim Staff Guidance-02 (ISG-02), the SSCs required to recover from a SBO event are in-scope for compliance with 10 CFR 50.46 for the purpose of license renewal. For FNP, this is 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.

Since SSCs that support LOSP, including onsite emergency power, are safety related (required for safe shutdown) and therefore already in-scope, only the additional SSCs not required for LOSP are explicitly identified for supporting SBO as part of the license renewal SBO scoping effort for FNP. The only equipment powered by EDG 2C specifically for SBO are the EDG 2C auxiliaries. The balance of the equipment capable of being powered by EDG 2C for SBO is the same B train equipment that is powered by EDG 1B or EDG 2B for a LOSP without SBO. Therefore for FNP LR, only EDG 2C and its auxiliaries and the plant system portion of the offsite power system including the start up transformers, oil-static cables, aluminum and aluminum with steel core overhead conductors, 230 kV disconnect switches, 230kV circuit breakers, and associated insulated power and control cables and its supports are considered to be within the scope of license renewal for SBO.

2.1.4 IDENTIFICATION OF STRUCTURES AND COMPONENTS SUBJECT TO AGING MANAGEMENT REVIEW

This section discusses the process used by SNC to (1) identify components and structural components (collectively abbreviated as SCs) that support the intended functions of in-scope systems and structures; and (2) identify which of these SCs require an aging management review.

The requirement to identify SCs subject to an aging management review is specified in 10 CFR 54.21(a)(1), which 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.

Component and Structure Intended Functions

The intended functions that the components and structures must fulfill are those functions that are the bases for including them within the scope of license renewal. A component function is an intended function if it must perform that function for the system to be able to perform the system intended function(s). For example, pressure boundary failure of a component would cause loss of inventory from the system, and the system would subsequently be unable to perform its intended function(s). Structures and components (SCs) may have multiple intended functions. FNP has considered multiple intended functions for SCs where applicable, consistent with the staff guidance provided in Table 2.1-3 of NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants.”

Table 2.1.4 provides the definitions of the component and structure intended functions used in the evaluation of components and structures.

Table 2.1.4 Component and Structure Intended Functions

Description	Intended Function
Debris Protection	Provide protection from debris
Environmental Control	Provide environmental control of plant areas not to exceed equipment limitations
Heat Transfer	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
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
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
Insulation Resistance	Provide insulation resistance to preclude shorts/grounds and unacceptable leakage current
Missile Barrier	Provide missile barrier (internally or externally generated)

Table 2.1.4 (cont'd)   Component and Structure Intended Functions

Description	Intended Function
Non-S/R Structural Support	Provide structural support to non-SR components whose failure could prevent satisfactory accomplishment of any of the required SR functions
Pipe Whip Restraint	Provide pipe whip restraint
Pressure Boundary	Provide pressure retaining boundary so that sufficient flow and adequate pressure is delivered
Radiation Shielding	Provide shielding against radiation
Reactivity Control	Provide reactivity control (e.g., boraflex in racks)
Shelter/Protection	Provide shelter/protection to SR components
Structural Support	Provide structural and/or functional support to SR components

Scoping and Screening of Mechanical, Civil/Structural, and Electrical Components

This portion of the FNP scoping and screening methodology is divided into three engineering disciplines: mechanical, civil/structural, and electrical/I&C (Instrumentation and Controls). The final product of the screening process is the identification of the SSCs subject to aging management review.

Component types used in the FNP integrated plant assessment include the use of commodity groups where appropriate. Commodity groups utilized are consistent with component types used by previous applicants and accepted by the NRC. Similar commodity groupings are presented in NEI 95-10 Rev. 3 and Table 2.1-5 of NUREG-1800.

Scoping of complex assemblies such as the emergency diesel generators and HVAC units is performed in accordance with the guidance presented in NEI 95-10 Rev. 3 and is consistent with the specific staff guidance presented in Table 2.1-5 of NUREG-1800.

The table in Appendix B of NEI 95-10 Rev. 3 is used to establish the active/passive nature of components for screening. This table presents the active/passive determinations that have been accepted by the NRC for most component types used in the plant.

The FNP screening process for consumables is in accordance with the guidance provided in Table 4.1-2 of NEI 95-10 Rev. 3. The guidance in NEI 95-10 is consistent with the specific staff guidance on consumables presented in Table 2.1-3 of NUREG-1800.

2.1.4.1 Mechanical Systems

For mechanical systems, a systematic process is used to identify components that require an aging management review, as described in the following sections.

2.1.4.1.1 Mechanical System Evaluation Boundaries

Mechanical system evaluation boundaries were established for each system within the scope of license renewal.

A boundary is defined as the portion of a system or structure, and its related components that is necessary to accomplish an intended function. Evaluation boundaries are defined in order to quickly focus the aging management review on the set of structures and components that directly contribute to the successful completion of the intended function(s) of a system or structure. The boundary may or may not match the system or structure boundary traditionally described in plant documents.

A license renewal boundary package has been developed for each mechanical LRA system. The boundary package for a LRA system is composed of one or more P&ID drawings. To determine the drawings applicable to a particular LRA system, the UFSAR and FSDs were reviewed. These P&IDs are color-coded to highlight the components required for the system to perform its intended functions.

2.1.4.1.2 Mechanical Components Associated With Intended Functions

Appendix B of NEI 95-10 lists most of the component types in use at FNP. This list is loaded into the scoping and screening database for use in screening. In order to ensure that all component types are identified, the UFSAR, FSDs, construction drawings, and material specifications are also consulted. These documents also provided information about materials and environments that are used to group components.

From the boundary diagrams, component types associated with each in-scope function are identified and listed in the scoping and screening database. Each function depicted on the boundary drawings is systematically reviewed by mechanical engineers familiar with system operation to determine all components associated with the function.

2.1.4.1.3 Mechanical Components Subject To Aging Management Review

Each mechanical component identified in **Section 2.1.4.1.2** on a boundary drawing is evaluated to the screening criteria in 10 CFR 54.21(a)(1). All components that contribute to the performance of an intended function, 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.

2.1.4.2 Civil Containments, Structures and Component Supports

A screening process was applied to buildings and civil structures determined to be in-scope in order to determine the types of structural elements utilized and the various materials and environments to be considered in the aging management reviews.

Evaluation boundaries are established for the various plant structures and structure groups within the scope of license renewal. Generally, the boundary for a building or structure is the entire building including base slabs, foundations, walls, beams, slabs, and steel superstructure. The various types of structural elements, materials, and environments that make up the buildings and structures are identified and listed. NUREG-1801 and NEI 95-10 contain lists of structures and structural elements; these are used as guidance. Structural drawings are reviewed to identify any structural components unique to FNP or that are not listed in NEI 95-10 or NUREG-1801. The listing of structural elements is facilitated by grouping these items into commodity groups. A list of structural commodity groups and components is developed for each civil/structural evaluation boundary.

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. Most structural elements have no moving parts and do not change configuration or properties, and are therefore subject to an aging management review.

2.1.4.3 Electrical and I&C Components

For electrical/I&C systems, a bounding approach as described in NEI 95-10 is used. Electrical/I&C component types used plant-wide are identified without regard to system. The component types subject to an aging management review are identified by applying the criteria of 10 CFR 54.21(a)(1). This method provides the most efficient means for determining the electrical/I&C components subject to an aging management review since most of these components are active.

The sequence of steps and special considerations for identification of electrical/I&C components that require an aging management review is as follows:

- All electrical and I&C component types in use at FNP were identified and listed. The listing provided by NEI 95-10 Appendix B is the basis for this list. Electrical component types are organized into commodity groups such as breakers, switches, and cables. Individual components were not identified. The electrical and I&C component commodity groups were identified from a review of plant documents, controlled drawings, the plant equipment database, and interface with the parallel mechanical and civil/structural screening efforts.

- Following the identification of the electrical and 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 (referred to as “passive” components). These components were identified utilizing the guidance of NEI 95-10 and the EPRI License Renewal Electrical Handbook.

- The other Rule 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. The 10 CFR 54.21(a)(1)(ii) screening criterion was applied to those specific components and commodity groups that were not eliminated by the application of the 10 CFR 54.21(a)(1)(i) screening criterion. 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, and are therefore not subject to an aging management review.

- 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, the wiring, terminal blocks, and connections located internal to a breaker cubicle were considered to be parts of the breaker. Accordingly, the breaker is screened, but not the individual internal parts.

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 FNP the electrical component types that require an AMR are cables, connectors, buswork, oil-static cables, and various switchyard components.

2.1.5 INTERIM STAFF GUIDANCE

Interim Staff Guidance (ISG) has been provided for a number of issues that affect scoping and screening, as well as aging management. SNC has developed positions for each of the ISG items that the NRC had formalized as of 75 days prior to the submittal of this application. There are some ISGs for which the NRC has not issued formal guidance. SNC has developed positions for the issued ISGs that reflect current industry philosophy. The SNC position for each ISG is provided in this section.

2.1.5.1 GALL (NUREG-1801) Contains One Acceptable Way to Manage Aging (ISG-01)

In a letter dated January 3, 2002, the NRC endorsed the position that NUREG-1801 represents one acceptable way to manage aging for license renewal, and that alternatives to NUREG-1801 exist. SNC concurs with this guidance. SNC will apply NUREG-1801 to aging management in most cases; however, SNC recognizes that alternatives to NUREG-1801 are appropriate in some plant-specific cases.

2.1.5.2 SBO Scoping (ISG-02)

Guidance has been issued by the NRC on scoping switchyard components for the recovery aspect from a Station Blackout (SBO) event: "For purposes of the license renewal rule, the staff considers that the portion of the offsite power equipment that includes the switchyard to the safety related buses should be included within the scope of the rule." The provisions of this ISG are incorporated into the scoping evaluations performed for FNP SSCs. SNC has included in-scope those switchyard components controlled by the plant that are necessary for the recovery of offsite power in accordance with the NRC guidance. Scoping and screening for SBO is discussed in **Section 2.1.3.3.5**. Electrical components subject to an aging management review are listed in **Section 3.6**.

2.1.5.3 Concrete Aging Management Program (ISG-03)

The provisions of this ISG are incorporated into the aging management reviews of the applicable concrete structures. Aging of concrete elements of Class I structures are being managed for the period of extended operation. Aging management of accessible and inaccessible areas is addressed consistent with the ISG. An evaluation of the below grade environment is included. The AMR results for concrete elements are described in **Section 3.5**. FNP considers the NRC-approved changes to NUREG-1801 included in ISG-03 when making determinations concerning consistency with NUREG-1801.

2.1.5.4 Fire Protection System Piping (ISG-04)

The provisions of this ISG are incorporated into the aging management program elements of the applicable fire protection components. The FNP Fire Protection Program is discussed in **Appendix B.4.5**. FNP considers the NRC-approved changes to NUREG-1801 included in ISG-04 when making determinations concerning consistency with NUREG-1801.

2.1.5.5 Fuse Holders (ISG-05)

SNC has identified and included in-scope those fuse holders that are not part of an active assembly and which perform an intended function. These fuse holders are treated similarly to terminal blocks. Aging effects for in-scope fuse holders have been evaluated and addressed. The final guidance provided by the NRC is used to evaluate aging effects, and determine whether or not an aging management program is required. Since fuse holders at FNP have no aging effects requiring management, attributes of ISG-05 do not apply. Fuse block aging effects are addressed in **Section 3.6**.

2.1.5.6 Housings for Active Components (ISG-06)

Based on past staff guidance and discussions, SNC considers housings for certain types of active, in-scope components such as fans, dampers, and cooling coils to be subject to aging management review. These components are identified in a screening process for each applicable system, and aging effects are managed as necessary.

2.1.5.7 Scoping Guidance for Fire Protection Systems, Structures, and Components (ISG-07)

This draft ISG provides guidance on the scoping of fire protection equipment for license renewal and the industry has provided comments. As stated in the draft ISG, "Each nuclear station has a unique FP program, and the licensing basis for meeting FP requirements is plant-specific. In short, plant-specific licensing basis documents establish the basis for making FP scoping determinations." The scoping effort to identify FNP SSCs that are relied upon for compliance to 10 CFR 50.48 meets the intent of ISG-07. Specifically, SNC has reviewed the FSAR, SERs, and other licensing documents applicable to the FNP FP Program to determine the plant-specific licensing basis for 10 CFR 50.48 compliance. The FNP scoping process for Fire Protection is discussed in **Section 2.1.3.3.1**.

2.1.5.8 Updating ISG Process (ISG-08)

This is a non-technical issue that has been deleted from the ISG list.

2.1.5.9 10 CFR 54.4(a)(2) Scoping (ISG-09)

As of July 1, 2003 the NRC is awaiting another response from NEI on this ISG. Some issues associated with 54.4(a)(2) scoping await final resolution. However, SNC states the following concerning this issue:

SNC has identified those non-SR piping systems and components whose failure could adversely affect SR equipment. Components associated with these piping systems are included in the scope of license renewal, and aging effects are managed accordingly. Scoping and screening for this rule criteria is addressed in **Section 2.1.3.2**.

2.1.5.10 "Class of '03" Standard License Renewal Application (SLRA) Format (ISG-10)

The NRC has reviewed the industry Standard License Renewal Format and provided comments. The FNP license renewal application closely follows the standard format.

2.1.5.11 Aging Management of Environmental Fatigue for Carbon and Low-Alloy Steel (ISG-11)

As of July 1, 2003 a draft of this ISG has not been issued. SNC applied a methodology to evaluate environmental fatigue of carbon and low-alloy steel that the NRC has previously approved for other license renewal applicants. SNC may revise the treatment of environmental fatigue for carbon and low-alloy steel to be consistent with the industry position if this ISG is issued accepting that position.

2.1.5.12 Operating Experience with Cracking of Class 1 Small-Bore Piping (ISG-12)

As of July 1, 2003 a draft of this ISG has not been issued. SNC has included inspection of the in-scope small-bore piping in the One-Time Inspection Program described in **Appendix B.5.5**. SNC may revise the treatment of small-bore piping to be consistent with the industry position if this ISG is issued accepting that position.

2.1.5.13 Management of Loss of Preload on Reactor Vessel Internals Bolting Using the Loose Parts Monitoring System (ISG-13)

As of July 1, 2003 a draft of this ISG has not been issued. SNC has not applied this ISG in the development of this LRA.

2.1.5.14 Operating Experience with Cracking in Bolting (ISG-14)

As of July 1, 2003 a draft of this ISG has not been issued. SNC has not applied this ISG in the development of this LRA.

2.1.5.15 Revision to Generic Aging Lessons Learned (NUREG-1801) Aging Management Program XI.E2 (ISG-15)

As of July 1, 2003 a draft of this ISG has not been issued. However, SNC recognizes the necessity of an alternate XI.E2 program for certain types of cables. This alternate XI.E2 program for FNP is described in **Appendix B.5.6.1**.

2.1.5.16 Time-Limited Aging Analyses Supporting Information for License Renewal Applications (ISG-16)

As of July 1, 2003 a draft of this ISG has been issued for comment. In **Section 4.0**, SNC has provided sufficient TLAA description and resolution consistent with 10 CFR 54.21.

With regard to the individual elements of the draft ISG, SNC has identified the TLAAs that apply to FNP pursuant to the criteria of 10 CFR 54.3. SNC has provided a table that addresses whether a TLAA that has been identified in NUREG-1800 applies to the FNP design or not and that identifies FNP-specific TLAAs.

Section 4.0 is consistent with the information that the ISG requests concerning Reactor Vessel Neutron Embrittlement, where the requests of the ISG are applicable to the FNP analyses. Tables are provided containing the information the ISG requests with respect to the locations stated in the ISG.

Section 4.0 is consistent with the ISG with respect to the data requested for metal fatigue. SNC has included in **Section 4.3** tables and text, which contain the data necessary to evaluate the fatigue TLAAs. This data includes an evaluation of the NUREG/CR-6260 locations and a discussion of the impact of environmentally assisted fatigue. Whereas SNC does not credit the Westinghouse generic technical reports, the applicant action items are not addressed. The FSAR supplement (**Appendix A**) includes a summary of the environmentally assisted fatigue evaluation and SNC's commitments with regard to the evaluation.

The Draft ISG discusses attributes of an acceptable EQ program that are not detailed in NUREG-1801. SNC will use the FNP EQ program (**Appendix B.3.7**) to manage the effects of aging on EQ equipment. The current FNP EQ program and FNP configuration control practices contain the elements discussed in the ISG, including the evaluation of mechanical cycling.

Loss of pre-stress in containment tendons is discussed in **Section 4.3.4** of the application. SNC has currently scheduled surveillances of FNP Unit 2 containment tendons for the next Unit 2 refueling outage. SNC may incorporate the data into calculations that develop the tendon pre-stress acceptance curves. SNC is not committed to the methodology of RG-1.35.1 for the current license term. The curves have been updated with existing data to show that there will be sufficient pre-stress in the containment tendons after 60 years of operation.

The analyses discussed in Section 4.6 of the Draft ISG do not apply to FNP, as SNC has identified no TLAAs on these subjects.

With regard to the plant specific analyses discussed in the Draft ISG, Items 1, 3, and 4 apply to FNP. The Leak-Before-Break Analyses for FNP are discussed in **Section 4.5.2.** The Reactor Coolant Pump Flywheel fatigue analysis is discussed in **Section 4.3.2.** Because the number of transients assumed in the original design is conservative for 60 years of operation (see **Section 4.3.1**), the pipe break postulation criteria remain unaffected and conservative for FNP.

SNC has used and has referenced certain analyses that contain proprietary information to develop **Section 4.0**. SNC has strived to provide sufficient non-proprietary description and evaluation information in the LRA for the staff review. The analyses are available for review. If requested, the proprietary analyses can be submitted in accordance with 10 CFR 2.790.

2.1.5.17 Bus Ducts (Iso-phase and Non-Segregated) for Electrical Bus Bar (ISG-17)

As of July 1, 2003 a draft of this ISG has not been issued. SNC has not applied this ISG in the development of this LRA.

2.1.5.18 Revision to NUREG-1801 Program XI.E3 for Inaccessible Medium Voltage Cable (ISG-18)

As of July 1, 2003 a draft of this ISG has not been issued. SNC has not applied this ISG in the development of this LRA. FNP's Program for inaccessible medium voltage cable is described in **Appendix B.5.6.2**.

2.1.6 GENERIC SAFETY ISSUES

In accordance with the guidance in NEI 95-10 and Appendix A.3 of NUREG-1800, "Standard Review Plan for 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 involving issues related to license renewal aging management reviews or TLAAs should be addressed in the License Renewal Application. Based on Nuclear Energy Institute (NEI) and NRC guidance, NUREG-0933 and previous license renewal applicants, SNC has identified the following GSIs to be addressed for FNP Units 1 and 2:

- GSI 168, Environmental Qualification of Electrical Equipment – This GSI has been closed by the NRC, as stated in Letter ACRSR-2028 from John T. Larkins, Executive Director of the Advisory Committee on Reactor Safeguards to William D. Travers, Executive Director for Operations, USNRC. EQ is addressed as a TLAA in **Section 4.4**.

- GSI 190, Fatigue Evaluation of Metal Components for 60-year Plant Life – This GSI addresses fatigue life of metal components and was closed by the NRC. 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.**

2.1.7 CONCLUSION

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

2.2 PLANT LEVEL SCOPING RESULTS

As described in the Scoping Methodology, the license renewal rule provides the criteria used to determine the systems, structures, and components within the scope of license renewal in 10 CFR 54.4. All FNP systems and structures have been evaluated and those which meet any of the criteria are considered to be within scope. If only a portion of a system meets any of the criteria, that system is considered to be within scope.

Tables 2.2-1a through **2.2-1f** provide the complete plant-specific list of FNP systems and structures within the scope of license renewal. These tables are comprised of three columns, described as follows:

- Column 1 is the "LRA System" name. Generally, these are the systems identified in NUREG 1801 Vol. 2 in the "Major Plant Sections" listing in the front of each system group section. For ease of review and comparison to NUREG 1801, FNP chose to use these systems in the LRA and AMR's, and group all FNP systems into appropriate LRA systems. LRA systems were also established for FNP systems within the scope of license renewal which do not appear in NUREG 1801.

- Column 2 provides the 10 CFR 54.4 scoping criteria met by each LRA system. Abbreviations used in this column are as follows:

  SR = Safety-Related, 10 CFR 54.4 (a) (1)
  PSRF = Non Safety-Related that can Prevent a Safety-Related Function, 10 CFR 54.4(a) (2)
  FP = Fire Protection, 10 CFR 54.4(a) (3)
  EQ = Environmental Qualification, 10 CFR 54.4(a) (3)
  PTS = Pressurized Thermal Shock, 10 CFR 54.4(a) (3)
  ATWS = Anticipated Transient Without Scram, 10 CFR 54.4(a) (3)
  SBO = Station Blackout, 10 CFR 54.4(a) (3)

Column 3 provides the Section 2 Scoping Results section number (linked).

Tables 2.2-1g through **2.2-1i** provide the list of FNP systems not within the scope of license renewal.

Table 2.2-1a Systems and Structures within the Scope of License Renewal - Reactor Coolant System

LRA System	**Scoping Criteria Met**	**Section 2 Scoping Results**
Reactor Vessel *Includes associated pressure boundary components for Control Rod Drive Mechanisms and Instrumentation.*	SR, FP, PTS	**2.3.1.1**
Reactor Vessel Internals	SR, PSRF, FP, PTS	**2.3.1.2**
Reactor Coolant System and Connected Lines *Includes the Pressurizer and RCPs.*	SR, PSRF, FP, EQ	**2.3.1.3**
Steam Generators	SR, PSRF, FP	**2.3.1.4**

Table 2.2-1b Systems and Structures within the Scope of License Renewal – Engineered Safety Features

LRA System	**Scoping Criteria Met**	**Section 2 Scoping Results**
Containment Spray	SR, PSRF, EQ	**2.3.2.1**
Containment Isolation *Includes:* *CTMT narrow range and extended range pressure monitoring and containment integrated leak rate test penetrations*	SR, PSRF, EQ	**2.3.2.2**
Emergency Core Cooling *Includes the following FNP Systems:* • *high head safety injection (including accumulators) portion of CVCS* • *RHR/Low Head Safety Injection* • *Refueling Water Storage Tank (RWST) and Transfer*	SR, PSRF, FP, EQ	**2.3.2.3**

Table 2.2-1c Systems and Structures within the Scope of License Renewal – Auxiliary Systems

LRA System	Scoping Criteria Met	Section 2 Scoping Results
New Fuel Storage *Included as a part of the Auxiliary Building Structures*	SR	**2.4.2.1**
Spent Fuel Storage *Included as a part of the Auxiliary Building Structures*	SR	**2.4.2.1**
Spent Fuel Cooling and Cleanup	SR, PSRF	**2.3.3.3**
Overhead Heavy & Refueling Load Handling Systems *Includes:* • *Refueling and Servicing Equipment and Special Tools* • *Aux Building and Containment Cranes, Hoists, and Elevators*	SR, PSRF	**2.3.3.4**
Open Cycle Cooling Water *Includes the following FNP Systems:* • *Service Water (SW)* • *portions of River Water (SW pond level instruments)*	SR, PSRF, FP, EQ, ATWS	**2.3.3.5**
Closed Cycle Cooling Water (FNP CCW System)	SR, PSRF, FP, EQ	**2.3.3.6**
Compressed Air *Includes the following FNP Systems:* • *Instrument Air* • *Service Air* • *Portions of River Water (N2 supply to SW pond level instruments)*	SR, PSRF, FP, EQ	**2.3.3.7**
Chemical and Volume Control *Includes the following FNP Systems:* • *non-ECCS portions of the HHSI/CVCS* • *Boron Thermal Regeneration*	SR, PSRF, FP, EQ	**2.3.3.8**

Table 2.2-1c (cont'd) Systems and Structures within the Scope of License Renewal - Auxiliary Systems

LRA System	Scoping Criteria Met	Section 2 Scoping Results
Control Room Area Ventilation	SR, FP	2.3.3.9
Auxiliary and Radwaste Area Ventilation *Includes the following FNP Systems:* • *Penetration Room Filtration* • *Engineered Safeguards Room Air Cooling* • *Radioactive Waste Ventilation and Filtration* • *Non-Radioactive Ventilation* • *Spent Fuel Pool Ventilation and Filtration*	SR, FP, EQ	2.3.3.10
Primary Containment Ventilation *Includes the following FNP systems:* • *Containment Cooling* • *Containment Purge*	SR, PSRF, FP, EQ	2.3.3.11
Yard Structures Ventilation *Includes Service Water Intake Structure and Diesel Generator Building Ventilation*	SR, FP, SBO	2.3.3.12
Fire Protection	FP	2.3.3.13
Diesel Fuel Oil	SR, FP, SBO	2.3.3.14
Emergency Diesel Generator (EDG) *Includes Diesel Auxiliaries:* • *EDG Lube Oil System* • *EDG Intercooler Water / Air Coolant System* • *EDG Jacket Coolant System* • *EDG Air Start System* • *EDG Air Intake and Exhaust*	SR, PSRF, FP, SBO	2.3.3.15
Demineralized Water	SR, PSRF, FP	2.3.3.16
High Energy Line Break Detection	SR, FP, EQ	2.3.3.17

Table 2.2-1c (cont'd) Systems and Structures within the Scope of License Renewal - Auxiliary Systems

LRA System	Scoping Criteria Met	Section 2 Scoping Results
Hydrogen Control *Includes the following FNP systems:* • *Containment Hydrogen Recombiner* • *Containment Post-LOCA Air Mixing* • *Reactor Cavity Post-LOCA Dilution* • *Post Accident Containment Venting and Sampling*	SR, EQ	**2.3.3.18**
Liquid Waste and Drains	SR, PSRF, FP, EQ	**2.3.3.19**
Oil-Static Cable Pressurization	SBO	**2.3.3.20**
Potable and Sanitary Water *Includes the following FNP systems:* • *Sanitary Water* • *Plant Hot Water Heating*	PSRF	**2.3.3.21**
Radiation Monitoring System	SR, EQ	**2.3.3.22**
Reactor Makeup Water	SR, PSRF	**2.3.3.23**
Sampling System	SR, FP, EQ	**2.3.3.24**

Table 2.2-1d Systems and Structures within the Scope of License Renewal - Steam and Power Conversion Systems

LRA System	Scoping Criteria Met	Section 2 Scoping Results
Main Steam *Also includes the following FNP systems:* • *Auxiliary Steam* • *portions of Feedwater Control*	SR, PSRF, FP, EQ, ATWS	2.3.4.1
Feedwater *Includes the following FNP systems:* • *Condensate and Feedwater System* • *Feedwater Control* • *Chemical Injection* • *portions of AFW*	SR, PSRF, FP, EQ, ATWS	2.3.4.2
Steam Generator Blowdown	SR, PSRF, ATWS	2.3.4.3
Auxiliary Feedwater *Also includes the following FNP system:* • *Condensate and Demineralized Water Transfer and Storage*	SR, PSRF, FP, EQ, ATWS	2.3.4.4
Auxiliary Steam and Condensate Recovery	PSRF	2.3.4.5
Turbine and Turbine Auxiliaries	PSRF, ATWS	2.3.4.6

Table 2.2-1e Systems and Structures within the Scope of License Renewal – Structures and Component Supports

LRA System	Scoping Criteria Met	Section 2 Scoping Results
Containment Structure *Includes Refueling Canal, Penetrations, Hatches and Fuel Transfer Tube*	SR, FP, PSRF	2.4.1
Auxiliary Building *Includes Spent Fuel and New Fuel Storage*	SR, PSRF, FP, SBO, ATWS	2.4.2.1
Diesel Generator Building	SR, PSRF, FP, SBO	2.4.2.2
Turbine Building	PSRF, FP, SBO, ATWS	2.4.2.3
Utility/Piping Tunnels *Includes Electrical Duct Banks and Pull Boxes*	SR, PSRF, FP, ATWS	2.4.2.4
Water Control Structures *Includes the following FNP structures:* • *Service Water Intake Structure* • *Service Water Discharge Structure* • *Storage Pond (UHS) Earthen Embankment and Spillway Structure*	SR, PSRF, FP	2.4.2.5
Steel Tank Structures (Foundations and Retaining Walls)	SR, FP	2.4.2.6
Yard Structures *Includes:* • *Switchyard* • *Fire Protection Pump House* • *Plant Vent Stack* • *Low Level Radwaste Storage Building* • *Solidification and Dewatering Facility*	PSRF, FP, SBO	2.4.2.7
Component Supports	SR, PSRF, FP, ATWS, SBO	2.4.3

Table 2.2-1f *Systems and Structures within the Scope of License Renewal – Electrical Components*

LRA System	Scoping Criteria Met	Section 2 Scoping Results
Plant-Wide Electrical Components *Includes the following systems:* • *AC Power Systems:* – *Station Transformers* – *Non Segregated Buses* – *4160 Volt Switchgear* – *Load Centers & Low Voltage Switchgear (480V and 600V)* – *Motor Control Centers* – *Disconnect Switches* – *AC Distribution Cabinets* – *120 Volt AC AC Vital Distribution System* – *120 Volt AC Regulated Distribution System* – *Misc. 120/208 Volt AC Equipment* • *Cables – Instrumentation, Power, & Control* • *Communication Systems* • *Containment Temperature Monitoring (includes dewpoint monitoring)* • *Core Cooling Monitoring* • *DC Power Systems:* – *D.C. Distribution System* – *Battery System* • *(Electrical) Containment Penetrations* • *Emergency Diesel Generator* • *Emergency Lighting* • *Engineered Safeguard Protection System*	SR, PSRF, FP, EQ, SBO, ATWS	**2.5.1**

Table 2.2-1f (cont'd) Systems and Structures within the Scope of License Renewal - Electrical Components

LRA System	Scoping Criteria Met	Section 2 Scoping Results

Plant-Wide Electrical Components (cont'd)
• *Feedwater Control*
• *Fire Protection Systems (incl. detection and alarms)*
• *Heat Tracing*
• *Lightning Protection*
• *Neutron Monitoring System*
• *Nuclear Instrumentation System*
• *Panels and Cabinets:*
  – *Control Room Panels*
  – *Local Control Panels & Racks*
  – *Local Relay Panels*
  – *Misc. Control Stations*
  – *Terminal Boards or Cabinets*
• *Power Transmission & Switchyard Systems:*
  – *Bus Work*
  – *Breakers, Switches*
  – *230KV Pipe Type Cable Circuits (oil-static cables)*
  – *Battery System*
  – *Protection System*
• *Radiation Monitoring Systems*
  – *Process Radiation Monitoring System*
  – *Area Radiation Monitoring System*
• *Reactor Protection System (includes AMSAC)*
• *Reactor Rod Control System (includes digital rod position indication)*
• *Turbine Control System*
	SR, PSRF, FP, EQ, SBO, ATWS	**2.5.1**

Table 2.2-1g Systems and Structures Not Within the Scope of License Renewal – Mechanical Systems

Mechanical Systems	
Auxiliary Drains and Vents System	Reactor Cavity Cooling System
Circulating Water System	Reactor Vessel Servicing Equipment
Closed Loop Aux. Steam & Condensate Recovery System (Waste and Recycle Evaporators)	Refueling Water Surface Ventilation System
Condenser and Auxiliaries	Roof Drains
Construction Sanitary Water System	Sanitary Drain System
Containment (Air) Recirculation System	Screen Wash System
Containment Pre-access Filtration System	Service Building Misc. Mechanical Systems
Control Rod Drive Mechanism Cooling System	Solid Waste Disposal System
Gaseous Waste Disposal System	Training & Emergency Operations Facility – Liquid Transfer & Storage System
General Service and Handling Equipment	Turbine Building HVAC System
Hydrogen & Nitrogen System	Turbine Bypass System
Lab Equipment	Vacuum Degasification System
Moisture Separator Reheater & Heater Drains System	Water Treatment System / Wells & Pumps
Nuclear Laundry	

Table 2.2-1h Systems and Structures Not Within the Scope of License Renewal - Structures

Structures	
Barge Dock	River Water Intake Structure
Chlorine House & Chlorine Bldg.	Old Steam Generator Storage Facility
Circulating Water Structures and Cooling Towers	Outage Support Building
Computer / Office Building	Security Building
Construction Facilities & Warehouses	Service Building
Containment Equipment Hatch Access Enclosure	Sewage Treatment Building
Cooling Tower Switchgear Houses	Snubber Test Building
Gate House	Support Building
Hydrogen Facility	Training Bldg & Emergency Operations Facility (EOF)
Main Warehouse & Fabrication Shop	Utility Building
Meteorological & Microwave Structures & Equipment	Water Treatment Building
Primary and Secondary Access Points	Yard Drainage, Grading, Landscaping & Roads
Railroad Structures	

Table 2.2-1i Systems and Structures Not Within the Scope of License Renewal – Electrical / I&C Systems

Electrical / I&C Systems	
Auxiliary Transformers	Misc. Starters
Cathodic Protection Systems	Misc. 600 Volt Equipment
Closed Circuit TV System	Misc. 277/480 Volt Equipment
Containment Atmosphere Control	Meteorological Analytical Data Management System
Computer Systems	Misc. Environs Monitoring & Sampling
Gross Failed Fuel Detection	Operator Training Simulator
Grounding Systems	Outage Support System (ECT & ROSA, Secondary Sampling, Containment Surveillance)
Incore Instrumentation	Portal Monitoring
Isolated Phase Bus	Response Time Testing System
Lighting	Security Systems
Load Control Equipment	Seismic Instrumentation
Main Generator and Auxiliaries	Steam Dump Control
Main Power Transformer	Temporary and Test Equipment
	Turbine Protection

2.3 SCOPING AND SCREENING RESULTS - MECHANICAL SYSTEMS

The determination of mechanical systems within the scope of license renewal is made by identifying FNP system functions and determining which ones satisfy one or more criteria contained in 10CFR 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**

2.3.1 REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

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 following approved WOG Generic Topical Reports were reviewed as a source of input information for FNP scoping:

- WCAP 14574-A, License Renewal Evaluation: Aging Management Evaluation for Pressurizers, December 2000.
- WCAP 14575-A, License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components, December 2000.
- WCAP 14577-A, Revision 1, License Renewal Evaluation: Aging Management for Reactor Internals, October 2000.

The Reactor Coolant System is described 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**
- Steam Generators, **Section 2.3.1.4**

2.3.1.1 Reactor Vessel

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. The upper closure head contains penetrations for control rod drive mechanisms (CRDMs), thermocouples, reactor vessel level indicating 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. Coolant enters the vessel through inlet nozzles and flows down the core barrel vessel wall annulus, turns at the bottom, and flows up through the core to the outlet nozzles. 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.

FNP UFSAR References

The reactor vessel is discussed in **FNP UFSAR Section 5.4**, Reactor Vessel and Appurtenances. Core Cooling Monitoring System instrumentation is discussed in **FNP UFSAR Section 4.4.5.5**, Instrumentation to Measure Reactor Coolant Inventory, and **FNP UFSAR Section 7.5.4**, Inadequate Core Cooling Monitoring System.

License Renewal Drawings

None

Components Subject to an AMR

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

Component Type	Intended Function
Bottom Head Torus and Dome	Pressure Boundary
Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary
Bottom Mounted Instrumentation Penetrations	Pressure Boundary
Core Exit Thermocouple (CET) and Heated Junction Thermocouple (HJTC) Closure Assemblies	Pressure Boundary
CET & HJTC Assembly Bolting	Pressure Boundary
Closure Head Dome and Flange	Pressure Boundary
Closure Studs, Nuts, and Washers	Pressure Boundary
Core Support Lugs	Structural Support
CRDM & Instrumentation Housing Penetration Nozzles	Pressure Boundary
CRDM Housing Flange Adapters	Pressure Boundary

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

Component Type	Intended Function
CRDM Latch Housings and Rod Travel Housings	Pressure Boundary
Head Vent Penetration	Pressure Boundary
Intermediate and Lower Shell Courses	Pressure Boundary
Leakage Monitoring Tube Assembly	Pressure Boundary
Primary Inlet and Outlet Nozzles (and nozzle support pads)	Pressure Boundary Structural Support
Primary Nozzle Safe Ends	Pressure Boundary
Refueling Seal Ledge	Pressure Boundary Structural Support
Vessel Flange	Pressure Boundary Structural Support
Seal Table and Fittings	Pressure Boundary
Upper (nozzle) Shell Course	Pressure Boundary
Ventilation Shroud Support Ring	Structural Support

2.3.1.2 Reactor Vessel Internals

System Description

The reactor internals consist of the lower core support structure, the upper core support structure, and the incore instrumentation support structures. 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 assemblies, the lower core plate, the neutron shield panels, the lower core support forging, the secondary support assembly, and associated support columns. 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 assembly, the upper core plate, support columns, and control rod guide tube assemblies. The incore instrumentation support structures consist of an upper system to convey and support thermocouples penetrating the vessel through the upper closure head and a lower system to convey and support flux thimbles penetrating the vessel through the bottom head.

FNP UFSAR References

The reactor vessel internals are discussed in **FNP UFSAR Section 4.2.2**, Reactor Vessel Internals.

License Renewal Drawings

None

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. See below for a description of the reactor vessel internals functions RVI-1 through RVI-6.

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

Component Type	Intended Function
Baffle and Former Plates	RVI-1, RVI-3, RVI-6
Baffle Bolts	RVI-1, RVI-3
Bottom Mounted Instrumentation (BMI) Column Cruciforms	RVI-4
BMI Columns	RVI-4
Clevis Inserts and Fasteners	RVI-1
Control Rod Guide Tube Assemblies	RVI-2
Core Barrel and Core Barrel Flange	RVI-1, RVI-3, RVI-6
Core Barrel Outlet Nozzles	RVI-3
CRGT Support Pins	RVI-2
Flux Thimble Tubes	RVI-4
Head / RPV Alignment Pins	RVI-2
Head Cooling Spray Nozzles	RVI-3
Heated Junction Thermocouple Probe Holder, Probe Holder Extension, and Probe Holder Shroud Assemblies	RVI-4
Internals Holddown Spring	RVI-1
Lower Core Plate and Fuel Alignment Pins	RVI-1, RVI-3, RVI-4, RVI-5

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

Component Type	Intended Function
Lower Support Columns	RVI-1, RVI-4, RVI-5
Lower Support Forging	RVI-1, RVI-3, RVI-4, RVI-5
Neutron Panels	RVI-6
Radial Support Keys and Fasteners	RVI-1
Secondary Core Support Assembly	RVI-1, RVI-3, RVI-4, RVI-5
Upper Core Plate Alignment Pins	RVI-2
Upper Core Plate and Fuel Alignment Pins	RVI-1, RVI-3
Upper Instrumentation Conduit and Supports	RVI-4
Upper Support Assembly	RVI-2
Upper Support Column Bases	RVI-2, RVI-4
Upper Support Columns	RVI-2, RVI-4

2.3.1.3 Reactor Coolant System and Connected Lines

System Description

RCS Piping Components

The RCS consists of three parallel heat transfer loops. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. In addition, the system includes interconnecting piping, and instrumentation necessary for operational control. All major components are located in the containment building.

During operation, the reactor coolant system transfers the heat generated in the core to the steam generators. Borated water is circulated in the reactor coolant system 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 reactor coolant system 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 system boundary includes all of the ASME Class 1 piping components, the Pressurizer, the Reactor Coolant Pumps and ASME Class 1 branch piping connected to the RCS loops. Based on this convention, the FNP RCS system boundary includes the ASME Class 1 portions of the Emergency Core Cooling System, Chemical and Volume Control System, and Sampling System. Non-ASME Class 1 piping components directly associated with the RCS boundary are also included in the system boundary.

RCS piping includes special components such as the pressurizer spray scoop, sample connection scoops, and RTD installation bosses and thermowells.

Pressurizer

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. A surge line nozzle and removable electric heaters are installed in the bottom head. 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.

Reactor Coolant Pumps

Each of the three 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.

FNP UFSAR References

The Reactor Coolant System and Connected Lines are discussed in **FNP UFSAR chapter 5.0**, Reactor Coolant System and Connected Systems. The pressurizer is discussed **in FNP UFSAR Section 5.5.10**, Pressurizer. The reactor coolant pumps are discussed in **FNP UFSAR Section 5.5.1**, Reactor Coolant Pumps.

License Renewal Drawings

D175037L Sh. 1
D175037L Sh. 2
D175002L Sh. 2
D175009L Sh. 1
D175009L Sh. 2
D175038L Sh. 1
D175038L Sh. 2
D175039L Sh. 1
D175039L Sh. 6
D205002L Sh. 2
D205009L Sh. 1
D205009L Sh. 2
D205037L Sh. 1
D205037L Sh. 2
D205038L Sh. 1
D205038L Sh. 2
D205039L Sh. 1
D205039L Sh. 6
D205041L Sh. 1
D506447L Sh. 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

Component Type	Intended Function
Closure Bolting, Class 1	Pressure Boundary
Piping, Class 1 (Reactor Coolant Loop)	Pressure Boundary
Piping, Class 1 (Piping Components < NPS 4)	Pressure Boundary
Piping, Class 1 (Piping Components ≥ NPS 4)	Pressure Boundary
Valve Bodies, Class 1	Pressure Boundary
Flow Orifice/Element, Class 1	Flow Restriction Pressure Boundary
RCP - Pump Casing	Pressure Boundary
RCP - Main Flange Bolts	Pressure Boundary
RCP - Main Closure Flange	Pressure Boundary
RCP - Thermal Barrier Assembly	Pressure Boundary
Pressurizer -Closure Bolting (Manway)	Pressure Boundary
Pressurizer - Heater Sheaths	Pressure Boundary
Pressurizer -Instrument Nozzles and Heater Well Nozzles	Pressure Boundary
Pressurizer - Manway and Cover	Pressure Boundary
Pressurizer -Nozzle Safe Ends	Pressure Boundary
Pressurizer - Nozzles (Surge, Spray, Safety, Relief)	Pressure Boundary

Table 2.3.1.3 (cont'd) Reactor Coolant System and Connected Lines Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Pressurizer - Shell, Upper Head, and Lower Head	Pressure Boundary
Pressurizer -Spray Head Assembly	Flow Direction
Pressurizer -Support Lugs	Structural Support
Pressurizer -Support Skirt and Flange	Structural Support
Pressurizer - Themal Sleeves (Surge and Spray Nozzles)	Pressure Boundary
Closure Bolting (Non Class 1)	Pressure Boundary
Piping, (Non Class 1)	Pressure Boundary
Valve Bodies, (Non Class 1)	Pressure Boundary

2.3.1.4 Steam Generators

System Description

Three steam generators are installed in each unit; one in each reactor coolant loop. The replacement steam generators at FNP are Westinghouse Model 54F design. The Unit 1 steam generators were installed in May of 2000. The Unit 2 replacement steam generators were installed in May of 2001. All steam generators are vertical U-tube evaporators 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.

FNP UFSAR References

The steam generators are discussed in **FNP UFSAR Section 5.5.2**, Steam Generator.

License Renewal Drawings

None

Components Subject to an AMR

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

Component Type	Intended Function
Channel Divider Plate	Flow distribution
Channel Head and Integral Primary Nozzles	Pressure Boundary Structural Support
Closure Bolting (Primary)	Pressure Boundary
Closure Bolting (Secondary)	Pressure Boundary
Feedwater Distribution Assembly (thermal sleeve, piping, and fittings, spargers, support structure)	Flow Distribution
Feedwater Inlet Nozzle	Pressure Boundary

Table 2.3.1.4 (cont'd) Steam Generator Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Primary Inlet and Outlet Nozzle Safe Ends	Pressure Boundary
Primary Manway Covers and Disc Inserts	Pressure Boundary
Primary Moisture Separator and Sludge Collector Assembly	Non-S/R Structural Support
Primary Nozzle Dam Rings	Structural Support
Secondary Moisture Separator Assembly	Non-S/R Structural Support
Secondary Side Manways, Handholes, Inspection Ports, Covers	Pressure Boundary
Stayrod Assemblies	Structural Support
Secondary Shell Penetrations	Pressure Boundary
Steam Outlet Flow Limiter	Flow Restriction
Tube Bundle Wrapper and Support Assembly	Structural Support
Tube Support Plates, Flow Distribution Baffles, and Anti-Vibration Bars	Structural Support Flow Distribution
Tubesheet	Pressure Boundary
U - Tubes	Pressure Boundary Exchange Heat
Upper Head (with Integral Steam Nozzle)	Pressure Boundary
Upper Shells, Lower Shells, and Transition Cones	Pressure Boundary

2.3.2 ENGINEERED SAFETY FEATURES

FNP UFSAR Section 6.2.1.1.3 defines the Engineered Safety Features systems as the High Head Safety injection System, Low Head Safety Injection System, Containment Spray System, Containment Cooling System, and Penetration Room Filtration 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 Containment Cooling System in **Section 2.3.3.11,** Primary Containment Ventilation System. The Penetration Room Filtration System is described in **Section 2.3.3.10**, Auxiliary and Radwaste Area Ventilation System. The FNP High Head Safety Injection portion of the CVCS and the RHR/Low Head Safety Injection System together comprise the NUREG-1801 Emergency Core Cooling System.

The Engineered Safety Features systems are described in the following sections:

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

2.3.2.1 Containment Spray System

System Description

The function of the Containment Spray (CS) System is to spray water into the containment atmosphere, when appropriate, in the event of a LOCA or main steam line break, to ensure that containment peak pressure remains below its design value. The CS System operates in two phases following actuation. During the initial (injection) phase of operation, water from the refueling water storage tank is used for containment spray. During the later (recirculation) phase of operation, water for containment spray is recirculated from the containment emergency sump. Baskets are located on the containment floor loaded with trisodium phosphate which dissolves into the recirculation fluid for post-accident sump pH control. The sump suction screens and the trisodium phosphate baskets are included in the Civil LRA system Containment Internal Structures. The vortex breakers in the emergency sump are included as part of the mechanical piping 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.

FNP UFSAR References

The Containment Spray System is discussed in **FNP UFSAR Section 6.2.2**, Containment Heat Removal Systems.

The containment Emergency Core Cooling System (ECCS) sump suction screens (included with Civil LRA system Containment Internal Structures), and vortex breakers are discussed in **FNP UFSAR Section 6.2.2**, Containment Heat Removal Systems, and **Appendix 6C**, Containment Sump Description and Emergency Core Cooling System Recirculation Mode Test Program.

The trisodium phosphate baskets used for containment sump pH control are included with Civil LRA system Containment Internal Structures, and are discussed in **FNP**

UFSAR Section 6.2.1, Containment Functional Design, and **FNP UFSAR Section 6.2.3.4.1**, ECCS Sump Recirculation pH Control System.

License Renewal Drawings

D175038L Sh. 3
D205038L Sh. 3
D506447L

Components Subject to an AMR

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

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Eductor	Pressure Boundary
Encapsulation Vessel	Pressure Boundary
Flow Orifice/Element	Pressure Boundary Flow Restriction
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Spray Nozzles	Flow Distribution
Valve Bodies	Pressure Boundary
Vortex Breakers	Flow Direction

2.3.2.2 Containment Isolation System

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. Rather, the system includes specific features included in other systems that penetrate the containment boundary.

The containment pressure monitoring intended function is also included in the Containment Isolation System boundary. These monitors provide essential indication of normal and post-accident containment pressure conditions and initiate safeguard actuation signals in response to abnormal containment pressure conditions.

Containment penetrations and associated containment isolation valves and components that ensure containment integrity, regardless of where they are described, require an aging management review. Process systems that have license renewal system intended functions in addition to containment isolation or containment pressure monitoring are addressed in the system screening results in the applicable portion of **Section 2.3** of this application.

The process systems or subsystems whose only license renewal intended functions are containment isolation or containment pressure monitoring are:

- Containment Isolation System
- Narrow Range Containment Pressure Monitoring (subsystem of the CS System)
- Extended Range Containment Pressure Monitoring System
- Containment Leak Rate Test System

Note that the pressure boundary (metallic) portions of electrical penetrations, pipe sleeve assembly surrounding process penetrations, and miscellaneous/spare mechanical penetrations that are not associated with a process system are included in the civil/structural screening described in **Section 2.4** of this application. The non-metallic and conductor portions of electrical penetrations are included in the electrical/I&C screening described in **Section 2.5** of this application.

FNP UFSAR References

The Containment Isolation System is discussed in **FNP UFSAR Section 6.2.4**, Containment Isolation System.

License Renewal Drawings

D175010L Sh. 1
D175010L Sh. 2
D175038L Sh. 3
D205010L Sh. 1
D205010L Sh. 2
D205038L Sh. 3
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.2.2 Containment Isolation Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Capillary Tubing (sealed)	Pressure Boundary
Closure Bolting	Pressure Boundary
Piping	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.2.3 Emergency Core Cooling System

The Emergency Core Cooling System includes the following FNP Systems:

- Residual Heat Removal / Low Head Safety Injection System
- High Head Safety Injection portion of the CVCS System
- Refueling Water Storage Tank (RWST) and Transfer System

System Description

Residual Heat Removal / Low Head Safety Injection

The primary function of the Residual Heat Removal (RHR) System is to remove radioactive decay heat energy from the reactor core, and sensible and pump heat from the Reactor Coolant System, during plant cooldown and refueling operations. A secondary function of the Residual Heat Removal System is to transfer refueling water between the Refueling Water Storage Tank (RWST) and the refueling canal at the beginning and end of refueling operations. This system also provides overpressurization protection for the Reactor Coolant System during low temperature Reactor Coolant System operations.

The Residual Heat Removal System is also utilized as the low head portion of the Safety Injection System. The Safety Injection System operates in two phases following a loss of coolant accident; injection and recirculation. During the injection phase the Residual Heat Removal System delivers borated water to the Reactor Coolant System from the RWST. During the recirculation phase, the Residual Heat Removal System cools and returns water collected in the containment emergency sump to the Reactor Coolant System, Containment Spray System, and Safety Injection System to maintain reactor core and containment cooling functions. The sump suction screens are included in the Civil LRA system Containment Internal Structures. The vortex breakers in the containment emergency sumps are included as part of the mechanical piping system.

The Residual Heat Removal System is described in **FNP UFSAR Section 5.2.2.4**, RCS Pressure Control During Low Temperature Operation, **Section 5.5.7**, Residual Heat Removal System, and **Section 6.3**, Emergency Core Cooling System.

High Head Safety Injection

The primary purpose of the High Head Safety Injection System is to deliver borated cooling water to the reactor core in the event of a loss-of-coolant accident to provide core cooling and reactivity control.

The High Head Safety Injection System is made up of dedicated components, such as the accumulators, along with portions of the Chemical and Volume Control System. This combination of components is utilized as the high head portion of the Safety Injection System. The accumulator tanks are charged using high pressure nitrogen to provide a passive means of injection. The nitrogen supply line to the accumulators isolates automatically on high penetration room pressure to support maintaining the negative pressure required for the penetration room filtration function (see **Section 2.3.3.10**, Auxiliary and Radwaste Area Ventilation System).

The High Head Safety Injection System operates in two phases following a loss of coolant accident; injection and recirculation. During the injection phase the charging pumps deliver borated water to the Reactor Coolant System from the RWST. The passive accumulators inject borated water into the Reactor Coolant System when RCS pressure drops below the accumulator pressure. During the recirculation phase, the charging pumps recirculate water to the RCS after the water has been cooled by the RHR heat exchangers.

Refueling Water Storage Tank (RWST) and Transfer System

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.

FNP UFSAR References for ECCS

The containment sump suction screens (included with Civil LRA system Containment Internal Structures), and vortex breakers are discussed in **FNP UFSAR Appendix 6C**, Containment Sump Description and Emergency Core Cooling System Recirculation Mode Test Program. The High Head Safety Injection System is described in **FNP UFSAR Section 6.3**, Emergency Core Cooling System. The RWST is described in **FNP UFSAR Section 6.2.2**, Containment Heat Removal Systems, and **Section 6.3**, Emergency Core Cooling System.

License Renewal Drawings for ECCS

D175009L Sh. 1
D175038L Sh. 1
D175038L Sh. 2
D175038L Sh. 3
D175039L Sh. 2
D175039L Sh. 6
D175041L Sh. 1
D175043L Sh. 1
D205009L Sh. 1
D205038L Sh. 1
D205038L Sh. 2
D205038L Sh. 3
D205039L Sh. 2
D205039L Sh. 6
D205041L Sh. 1
D205043L Sh. 1
D200219L Sh. 72
B170058L Sh. 72
B170058L Sh. 72A
D506447L
D170118L Sh. 1
D175002L Sh. 1, 3
D175037L Sh. 2
D205002L Sh. 1
D205002L Sh. 3
D205037L Sh. 2
D200012L Sh. 1

Components Subject to an AMR

Table 2.3.2.3 Emergency Core Cooling System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Charging/SI Pump Mini-Flow Orifices	Flow Restriction Pressure Boundary
Closure Bolting	Pressure Boundary
Encapsulation Vessel	Pressure Boundary
Flow Orifice/Element	Flow Restriction Pressure Boundary
RHR Heat Exchanger (channel head)	Pressure Boundary
RHR Heat Exchanger (shell)	Pressure Boundary
RHR Heat Exchanger (tube sheet)	Pressure Boundary
RHR Heat Exchanger (tubes)	Exchange Heat Pressure Boundary
Oil Cooler (shell)	Pressure Boundary
Oil Cooler (channel head)	Pressure Boundary
Oil Cooler (tubes)	Exchange Heat Pressure Boundary
Piping	Pressure Boundary
High Head & RHR Pump Casings	Pressure Boundary
Safety Injection Accumulators	Pressure Boundary
Refueling Water Storage Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary
Vortex Breaker	Flow Direction

2.3.3 AUXILIARY SYSTEMS

The Auxiliary Systems are described in the following sections:

- New Fuel Storage, **Section 2.3.3.1**
- Spent Fuel Storage, **Section 2.3.3.2**
- Spent Fuel Pool Cooling and Cleanup System, **Section 2.3.3.3**
- Overhead Heavy and Refueling Load Handling System, **Section 2.3.3.4**
- Open-Cycle Cooling Water System, **Section 2.3.3.5**
- Closed-Cycle Cooling Water System, **Section 2.3.3.6**
- Compressed Air System, **Section 2.3.3.7**
- Chemical and Volume Control System, **Section 2.3.3.8**
- Control Room Area Ventilation System, **Section 2.3.3.9**
- Auxiliary and Radwaste Area Ventilation System, **Section 2.3.3.10**
- Primary Containment Ventilation System, **Section 2.3.3.11**
- Yard Structures Ventilation System, **Section 2.3.3.12**
- Fire Protection, **Section 2.3.3.13**
- Diesel Fuel Oil System, **Section 2.3.3.14**
- Emergency Diesel Generator System, **Section 2.3.3.15**
- Demineralized Water System, **Section 2.3.3.16**
- High Energy Line Break Detection System, **Section 2.3.3.17**
- Hydrogen Control System, **Section 2.3.3.18**
- Liquid Waste and Drains, **Section 2.3.3.19**
- Oil-Static Cable Pressurization System, **Section 2.3.3.20**
- Potable and Sanitary Water System, **Section 2.3.3.21**
- Radiation Monitoring System, **Section 2.3.3.22**
- Reactor Makeup Water Storage System, **Section 2.3.3.23**
- Sampling System, **Section 2.3.3.24**

2.3.3.1 New Fuel Storage

See “Auxiliary Building” in **Section 2.4.2.1**.

2.3.3.2 Spent Fuel Storage

See “Auxiliary Building” in **Section 2.4.2.1**.

2.3.3.3 Spent Fuel Pool Cooling and Cleanup System

System Description

The Spent Fuel Cooling and Cleanup 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, and the RWST.

The spent fuel pool cooling and cleanup system consists of two cooling trains, a purification loop, and a surface skimmer loop. The spent fuel pool cooling portion of the system removes decay heat from the spent fuel stored in the spent fuel pool to maintain the pool within established temperature limits and minimize evaporative losses. Heat is transferred from the spent fuel pool cooling and cleanup system through the heat exchanger to the component cooling system.

FNP UFSAR References

The Spent Fuel Cooling and Cleanup System is discussed in **FNP UFSAR Section 9.1.3**, Spent-Fuel Pool Cooling and Cleanup System.

License Renewal Drawings

D175043L Sh. 1
D205043L Sh. 1
D175002L Sh. 1
D175047L Sh. 1
D205002L Sh. 1
D205047L Sh. 1
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.3.3 Spent Fuel Pool Cooling and Cleanup Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Heat Exchanger (channel head)	Pressure Boundary
Heat Exchanger (shell)	Pressure Boundary
Heat Exchanger (tube sheet)	Pressure Boundary
Heat Exchanger (tubes)	Exchange Heat Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.4 Overhead Heavy and Refueling Load Handling System

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

- Refueling and Servicing Equipment and Special Tools
- Auxiliary Building and Containment Cranes, Hoists, and Elevators

System Description

Overhead Heavy and Refueling Load Handling System include the fuel handling equipment required to refuel the reactor. These systems provide for handling and storage of fuel assemblies from receipt of new fuel to shipment of spent fuel. The major fuel handling equipment includes the Containment polar crane, Reactor Cavity manipulator cranes, spent fuel bridge cranes, and the spent fuel cask crane. This category also includes the special tools and adapters used for lifting and handling the vessel head, internals, fuel assembly inserts, etc.

Fuel handling devices have provisions to avoid dropping or jamming of fuel assemblies during transfer operation.

FNP UFSAR References

The Overhead Heavy and Refueling Load Handling System are discussed in **FNP UFSAR Section 9.1.4**, Fuel Handling System.

License Renewal Drawings

N/A

Components Subject to an AMR

Table 2.3.3.4 Overhead Heavy and Refueling Load Handling System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Baseplates and anchors for attachment to structures, & retaining clips	Non-S/R Structural Support Structural Support
Cranes including bridge & trolley: Structural Girders	Non-S/R Structural Support Structural Support
Rail System: Rail	Non-S/R Structural Support Structural Support

2.3.3.5 Open-Cycle Cooling Water System

The Open-Cycle Cooling Water System includes the following FNP systems:

- Service Water (SW) System
- Portions of the River Water System (SW pond level instruments)

System Description

The Service Water System provides cooling water to plant loads during normal and emergency modes of operation. Heat loads include the Component Cooling Water System, room coolers, containment coolers, emergency diesel generators, and certain turbine building loads. The system also provides a backup supply to the Auxiliary Feedwater System.

The Service Water System draws cooling water from the service water pond, which serves as the ultimate heat sink for FNP. The ultimate heat sink is discussed in **Section 2.4.2.5**, Water Control Structures. The River Water System supplies make-up water to the service water pond. The only portions of the River Water System that are in the scope of the Open Cycle Cooling Water System are the service water pond water-level instruments used for aligning the Service Water System into its emergency recirculation mode.

FNP UFSAR References

The FNP systems that comprise the Open-Cycle Cooling Water LRA System are discussed in **FNP UFSAR Section 9.2.1**, Station Cooling Water Systems (River Water, Service Water, and Circulating Water Systems). The cooling water to the emergency diesel generator heat exchangers is also provided from the Service Water System and is discussed in **FNP UFSAR Section 9.5.5**, Diesel Generator Cooling Water System.

License Renewal Drawings

A170059L Shts. 146, **147**, **148**, **186**, **187**, **188**, **199**, **200**, **201**, **202**, **203**, **204**, & **205**
A170059L Shts. 206, **207**, & **208**
A170771L Sh. 2 & **3**
A200475L Shts. 47, **48**, **49**, **87**, **88**, & **89**
A200476L Shts. 1, 2, **3**, **4**, **5**, **6**, **7**, **8**, **9**, & **10**
B170058L Shts. 39, **40**, **41**, **42**, **43**, **44**, **45**, **64**, & **65**
B200219L Shts. 39, **40**, **41**, **42**, **43**, **44**, **45**, **64**, & **65**
D170113L Sh. 1
D170119L Shts. 1, **2**, **3**, **5**, & **7**
D170382L Sh. 1
D170476L Sh. 1
D170800L Sh 1 & **2**
D170802L Sh 1 & **2**
D170803L Sh 1 & **2**
D170804L Sh 1 & **2**
D170805L Sh 1 & **2**
D175003L Shts. 1, 2, **3**, & **4**
D175007L Sh. 1
D200013L Shts. 2, **3**, **5**, & **8**
D200014L Sh. 1
D200209L Sh. 1
D200210L Sh. 1
D200211L Sh. 1
D205003L Shts. 1, **2**, **3**, & **4**
D205007L Sh. 1
D506447L
D175002L Sh. 1
D175011L Sh. 3
D205002L Sh. 1
D205011L Sh. 3
D175014L Sh. 2
D205014L Sh. 2

Components Subject to an AMR

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

Component Type	Intended Function
Air Compressor Lube oil Cooler (channel Head)	Pressure Boundary
Air Compressor Lube oil Cooler (shell)	Pressure Boundary
Air Compressor Lube oil Cooler (tubes/tubesheet)	Pressure Boundary, Exchange Heat (tubes only)
Air Compressor Intercooler, Aftercooler, and Bleed-Off Air cooler (shells)	Pressure Boundary
Air Compressor Bleed-Off Air Cooler (channel head)	Pressure Boundary
Air Compressor Intercooler, Aftercooler, and Bleed-Off Air cooler (tubes/tubesheet)	Pressure Boundary, Exchange Heat (tubes only)
Closure Bolting	Pressure Boundary
CCW Heat Exchanger (Channel Head)	Pressure Boundary
CCW Heat Exchanger (shell)	Pressure Boundary
CCW Heat Exchanger (tubesheet)	Pressure Boundary

Table 2.3.3.5 (cont'd) Open-Cycle Cooling Water System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
CCW Heat Exchanger (tubes)	Exchange Heat Pressure Boundary
Containment & ESF Room Coolers (channel head & tubes))	Pressure Boundary Exchange Heat (tubes only)
Flow Orifice/Element	Flow Restriction Pressure Boundary
Piping	Pressure Boundary
Piping With Guard Pipe	Pressure Boundary
Service Water Pump Casings	Pressure Boundary
Lube and Cooling Water Pump Casings	Pressure Boundary
Strainers (element)	Debris Protection
Strainers (shell)	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.6 Closed-Cycle Cooling Water System

System Description

The Closed-Cycle Cooling Water LRA System includes the FNP Component Cooling Water (CCW) System. The CCW System is a closed-loop system that transfers heat to the Service Water System from components which process radioactive fluid. The CCW System acts as an intermediate heat transfer system between potentially radioactive heat sources and the Service Water System to reduce the probability of radioactive releases to the environment resulting from a leaking component. The primary safety function of the CCW System is removal of heat from various safety-related components.

FNP UFSAR References

The Closed-Cycle Cooling Water System is discussed in **FNP UFSAR Section 9.2.2**, Cooling System for Reactor Auxiliaries.

License Renewal Drawings

D175002L Shts. 1, **2**, & **3**
D175041L Sh. 1
D175042L Sh. 1
D205002L Shts. 1, **2**, & **3**
D205041L Sh. 1
D205042L Sh. 1
D506447L Sh. 1
D175039L Sh. 1
D175039L Sh. 2
D175043L Sh. 1
D205039L Sh. 1
D205039L Sh. 2
D205043L Sh. 1

Components Subject to an AMR

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

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Flow Orifice/Element	Flow Restriction Pressure Boundary
Reactor Coolant Drain Tank Heat Exchanger (shell)	Pressure Boundary
Reactor Coolant Drain Tank Heat Exchanger (tubes and tube sheet)	Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
CCW Surge Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.7 Compressed Air System

The Compressed Air LRA System includes the following FNP systems:

- Instrument Air System
- Service Air System
- Portions of the River Water System that provide the nitrogen backup supply to the service water pond level instruments

System Description

The Instrument Air System supplies compressed air for pneumatic instruments and valves, and for the Service Air System. SR air operated valves and instruments that are required to operate following design basis events (e.g., main steam isolation valves, pressurizer power operated relief valves), and which are normally supplied by instrument air, are provided with back-up sources of either air (accumulators) or compressed nitrogen. Portions of the instrument air system are also relied upon in the Appendix R safe shutdown analysis.

The Service Air System routes compressed air supplied by the Instrument Air System to service air outlets throughout the plant. The Service Air System also contains emergency air compressors to support operation of the main steam atmospheric relief valves and turbine driven auxiliary feedwater pump steam admission valves when the instrument air system is not available.

The River Water System supplies make-up water to the service water pond. The only portions of the River Water System that are in the scope of the compressed air LRA system are the compressed nitrogen back-up supplies to the service water pond level instruments used for aligning the Service Water System into its emergency recirculation mode.

FNP UFSAR References

The Compressed Air System is discussed in **FNP UFSAR Section 9.3.1**, Compressed Air System. The in-scope portions of the River Water System are discussed in **FNP UFSAR Section 9.2.1**, Station Cooling Water Systems (River Water, Service Water, and Circulating Water Systems).

License Renewal Drawings

A170059L Shts. 5, **6**, **7**, & **8**
A170771L Sh. 2 & **3**
A200474L Shts. 5, **6**, & **7**
D170131L Shts. 1, **2**, **3**, **4**, & **5**
D175017L Sh. 1
D175034L Shts. 1, **2**, & **3**
D175035L Sh. 1 & **2**
D200019L Sh. 1 & **2**
D200021L Sh. 1
D205034L Shts. 1, **2**, **3**, & **4**
D205035L Sh. 1 & **2**
D205048L Sh. 5
D170119L Sh. 7
D175019L Sh. 1
D175022L Sh. 1
D205019L Sh. 1
D205022L Sh. 1
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.3.7 Compressed Air System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Air Accumulators	Pressure Boundary
Air Dryer	Pressure Boundary
Air Receiver	Pressure Boundary
Closure Bolting	Pressure Boundary
Filters (casing)	Pressure Boundary
Piping	Pressure Boundary
Fluid Traps	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.8 Chemical and Volume Control System

For the purposes of this application, the Chemical and Volume Control System (CVCS) includes the following systems:

- Non-ECCS portions of the CVCS
- Boron Thermal Regeneration System (BTRS)

System Description

The Chemical and Volume Control System maintains the required inventory in the RCS by maintaining the programmed water level in the pressurizer. The CVCS provides a continuous feed and bleed of reactor coolant water which is used in the control of water chemistry conditions, activity level, and soluble chemical neutron absorber concentration and makeup. 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. The system includes provisions for recycling reactor grade water. Portions of the CVCS 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 2.3.2.3** of this application.

The Boron Thermal Regeneration System is occasionally used as deborating demineralizers to reduce reactor coolant boron concentration towards the end of core life. Although not typically used for this purpose at FNP, the BTRS is designed to provide load following capabilities by varying the RCS boron concentration to compensate for xenon transients and other reactivity changes which occur when the reactor power level is changed. The RCS boron concentration is changed by storing boron in, or releasing boron from, thermally regenerable demineralizers. The function of this system is not safety related. The BTRS is installed for economic reasons only. Safety-related boration and dilution is performed by the CVCS. However, when in use the BTRS forms part of the letdown path for the CVCS and is a high energy line.

High energy line break compartment/room pressure sensors are provided in areas affected by a rupture of a CVCS letdown line or a BTRS line to initiate letdown line isolation. The compartment/room pressure sensors are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

FNP UFSAR References

The CVCS is discussed in **FNP UFSAR Section 9.3.4.1**, Chemical and Volume Control System. The BTRS is discussed in **FNP UFSAR Section 9.3.4.2**, Boron Thermal Regeneration System.

License Renewal Drawings

D175039L Shts. 1, 2, 3, 4, 6, & 7
D175040L Sh. 1
D175042L Shts. 1, 5, 6, & 10
D205039L Shts. 1, 2, 3, 4, 6, & 7
D205040L Sh. 1
D205042L Sh. 1, 5, & 6
D175002L Sh. 2
D175009L Sh. 1
D175037L Sh. 2
D175038L Sh. 1
D175041L Sh. 1
D205002L Sh. 2
D205009L Sh. 1
D205037L Sh. 2
D205038L Sh. 1
D205041L Sh. 1
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.3.8 Chemical and Volume Control System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Regenerative Heat Exchanger (channel heads)	Pressure Boundary
Regenerative Heat Exchanger (shells)	Pressure Boundary
Regenerative Heat Exchanger (tubes / tubesheet)	Pressure Boundary Exchange Heat
Letdown, Excess Letdown, & RCP Seal Water Heat Exchangers (channel head)	Pressure Boundary
Letdown, Excess Letdown, & RCP Seal Water Heat Exchangers (shell)	Pressure Boundary

Table 2.3.3.8 (cont'd) Chemical and Volume Control System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Letdown, Excess Letdown, & RCP Seal Water Heat Exchangers (tubes / tubesheet)	Pressure Boundary Exchange Heat
Boron Thermal Regeneration Chiller (channel head)	Pressure Boundary
Boron Thermal Regeneration Chiller (tubes / tubesheet)	Pressure Boundary
Boron Thermal Regeneration Moderating & Reheat Heat Exchanger (channel head and shell)	Pressure Boundary
Boron Thermal Regeneration Moderating & Reheat Heat Exchangers (tubes / tubesheet)	Pressure Boundary
Demineralizers (Pressure Retaining Components)	Pressure Boundary
Filters (casing)	Pressure Boundary
Letdown Orifices	Pressure Boundary Flow Restriction
Piping	Pressure Boundary
Boric Acid Transfer Pump Casings	Pressure Boundary
Boric Acid Tanks	Pressure Boundary
Volume Control Tank	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.9 Control Room Area Ventilation System

System Description

The Control Room Area Ventilation System provides ventilation, heating, cooling, filtration, and air intake and exhaust isolation during normal operation and following a design basis accident. The system consists of two parts, an environmental control system and an air cleanup system. The environmental control system operates continually during normal and emergency conditions. The air cleanup system normally operates only during emergency conditions. The Control Room Area Ventilation System has three operational modes: normal ventilation, emergency pressurization, and emergency recirculation. The safety-related operating modes are emergency recirculation and emergency pressurization. This system maintains the control room environment within design limits and ensures compliance with control room dose requirements of 10 CFR 50 Appendix A General Design Criterion 19.

FNP UFSAR References

The Control Room Area Ventilation System is discussed in **FNP UFSAR Section 6.4**, Habitability Systems and **Section 9.4.1**, Control Room.

License Renewal Drawings

D175012L Sh. 1
D175012L Sh. 2
D205012L Sh. 1

Components Subject to an AMR

Table 2.3.3.9 Control Room Area Ventilation System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Compressible Joints & Seals	Pressure Boundary
Cooling Coils (HVAC Refrigerant Coils and Fins)	Pressure Boundary Exchange Heat
Ducts and Fittings	Pressure Boundary
Equipment Frames & Housings	Pressure Boundary
Fire Dampers (Frames & Housings Only)	Pressure Boundary Fire Barrier
Flexible Connectors	Pressure Boundary
Piping	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.10 Auxiliary and Radwaste Area Ventilation System

The Auxiliary and Radwaste Area Ventilation LRA System includes the following FNP systems:

- Penetration Room Filtration System
- Engineered Safeguards Room Air Cooling System
- Radioactive Waste Ventilation & Filtration System
- Non-Radioactive Ventilation System
- Spent Fuel Pool (SFP) Ventilation & Filtration System

System Description

The Penetration Room Filtration (PRF) System can be aligned to operate under either of two (2) accident modes, namely the post-LOCA operating mode or the fuel handling mode. The PRF limits releases to the environment of radioisotopes from ECCS leakage into the penetration rooms during accident (post-LOCA) conditions. The PRF System maintains a negative pressure on the room boundary to ensure leakage is into the room and filtered prior to being exhausted. Although not credited in accident analyses, the PRF System also filters radioisotopes leaked through the containment boundary into the penetration area. The PRF also provides safety-related ventilation and filtration for the spent fuel pool area. The room pressure sensors assigned to the PRF System that detect elevated room pressure are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

The Engineered Safeguards Room Air Cooling System maintains the ambient temperature within analyzed limits in rooms containing designated equipment important to safety.

The Radioactive Waste Ventilation & Filtration System provides a suitable environment for personnel and for equipment operation in Auxiliary Building areas with the potential for radioactive contamination. The system also controls and directs potentially contaminated air to the vent stack via filtration units. This system is only in the scope of license renewal because of fire dampers in the system.

The Non-Radioactive Ventilation System provides a suitable environment for personnel and for equipment operation in portions of the Auxiliary Building containing systems which are normally not radioactively contaminated. Battery room exhaust continuously removes combustible gases. This system is also in-scope of license renewal because of fire dampers in the system.

The Spent Fuel Pool Ventilation & Filtration System provides normal ventilation and filtration for the spent fuel pool area. The system is designed to maintain a suitable environment for personnel and for equipment operation in the spent fuel areas, remove water vapors above the SFP to improve visibility, filter SFP area exhaust air during normal operation, and to maintain a slightly negative pressure in the SFP area with respect to the surrounding areas and the outside. Following a fuel handling accident, the spent fuel pool ventilation and filtration isolates and realigns to route the exhaust air from the SFP area to the PRF System to ensure proper filtration and monitoring of the exhaust air.

The plant vent stack noble gas radiation monitor, which is required to comply with RG 1.97 requirements (Category 2 variable), is conservatively included in the scope of the License Renewal as part of the Auxiliary and Radwaste Area Ventilation LRA System.

FNP UFSAR References

The Penetration Room Filtration System is discussed in **FNP UFSAR Section 6.2.3**, Containment Air Purification and Cleanup systems. The Engineered Safeguards Room Air Cooling System is discussed in **FNP UFSAR Section 9.4.2**, Auxiliary Building. The Radioactive Waste Ventilation & Filtration System is discussed in **FNP UFSAR Section 9.4.3**, Radwaste Area. The Non-Radioactive Ventilation System is discussed in **FNP UFSAR Section 9.4.2**, Auxiliary Building. The Spent Fuel Pool Ventilation & Filtration System is discussed in **FNP UFSAR Section 9.4.2**, Auxiliary Building.

License Renewal Drawings

D175003L Sh. 2
D175003L Sh. 3
D175011L Sh. 1, **2**, & **3**
D175012L Sh. 1
D175014L Sh. 1
D175014L Sh. 2
D175022L Sh. 1
D175034L Sh. 1
D175045L Sh. 1
D205003L Sh. 2
D205003L Sh. 3
D205011L Sh. 1, **2**, & **3**
D205012L Sh. 1
D205014L Sh. 1
D205014L Sh. 2
D205022L Sh. 1
D205034L Sh. 3
D205045L Sh. 1

Components Subject to an AMR

Table 2.3.3.10 Auxiliary and Radwaste Area Ventilation System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Compressible Joints & Seals	Pressure Boundary
Ducts & Fittings	Pressure Boundary
Equipment Frames & Housings	Pressure Boundary
Cooling Units (Fan / Coil Fins Only)	Exchange Heat
Fire Dampers (Frames & Housings Only)	Pressure Boundary Fire Barrier
Flexible Connector	Pressure Boundary
Flow Orifice/Element	Flow Restriction Pressure Boundary
Piping	Pressure Boundary
Pitot Tube	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.11 Primary Containment Ventilation System

The Primary Containment Ventilation LRA System includes the following FNP systems:

- Containment Cooling System
- Containment Purge System

System Description

The Containment Cooling System removes heat from containment during normal operation and shutdown, and functions as one of the post-accident containment heat removal systems. Each containment is equipped with four (4) containment cooler units. Each air cooler consists of a housing equipped with a fan and finned tube coils supplied by water from the service water system. Dropout plates with release mechanisms actuated by fusible links are provided at the discharge of the containment coolers. These plates fall away to uncouple the cooler discharge from the distribution ductwork after a LOCA.

The Containment Purge System provides ventilation and filtration to allow access to the containment after shutdown. During normal power operation, the main purge valves are isolated and the mini-purge portion of the system provides for continuous ventilation and filtration of the containment atmosphere. Safety-related reasons for venting containment during normal power operations include controlling containment pressure and reducing airborne radioactivity (to allow periodic occupation of the containment during normal power operation). Containment isolation valves on the supply and exhaust lines isolate in response to a Phase A containment isolation signal or on high radiation at the purge exhaust radiation monitors (fuel handling accident).

FNP UFSAR References

The Containment Cooling System is discussed in **FNP UFSAR Section 6.2.2**, Containment Heat Removal Systems. The Containment Purge System is discussed in **FNP UFSAR Section 6.2.3**, Containment Air Purification and Cleanup Systems.

License Renewal Drawings

D175003L Sh. 4
D175010L Sh. 1 & **2**
D175019L Sh. 1
D205003L Sh. 4
D205010L Sh. 1 & **2**
D205019L Sh. 1

Components Subject to an AMR

Table 2.3.3.11 Primary Containment Ventilation System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Compressible Joints and Seals	Pressure Boundary
Ducts & Fittings	Pressure Boundary
Equipment Frames and Housings	Pressure Boundary
Cooling Coil (Fins Only)	Exchange Heat
Fire Dampers (Frames and Housings Only)	Pressure Boundary Fire Barrier
Flexible Connectors	Pressure Boundary
Flow Orifice/Element	Pressure Boundary
Piping	Pressure Boundary
Pitot Tube	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.12 Yard Structures Ventilation System

The Yard Structure Ventilation LRA System includes the FNP HVAC systems servicing the various yard structures at the plant. The portions of the Yard Structures Ventilation System in the scope of License Renewal are at the Service Water Intake Structure (SWIS) and at the Diesel Generator Building.

System Description

The SWIS and Diesel Generator Building Ventilation systems provide heating and ventilation to their associated structures to provide suitable environments for personnel and for equipment operation during normal as well as emergency conditions. The Service Water Intake Structure Ventilation system also functions to minimize hydrogen concentration in the safety related battery rooms.

FNP UFSAR References

The Yard Structure Ventilation systems are discussed in **FNP UFSAR Section 9.4.5**, Service Water Intake Structure, and **Section 9.4.7**, Diesel Generator Building. The intake air system is shown on **FNP UFSAR Figure 9.4-2**, Units 1 and 2 Diesel Generator Building Equipment Location On Roof.

License Renewal Drawings

D506444L Sh. 1
D506445L Sh. 1

Components Subject to an AMR

Table 2.3.3.12 Yard Structures Ventilation Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Ducts & Fittings	Pressure Boundary
Equipment Frames and Housings	Flow Direction Pressure Boundary
Fire Dampers (Frames and Housings Only)	Flow Direction Fire Barrier

2.3.3.13 Fire Protection

System Description

The Fire Protection System protects plant personnel and equipment in the event of a fire to ensure safe shutdown of the plant and to minimize the risk of a release of radioactive material to the environment. Fire Protection features include fire suppression, fire detection and actuation, and fire barriers. 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 Fire Protection System includes both manual (use of hoses, portable extinguishers, fixed systems by plant personnel) and automatically actuated fire suppression features. Depending on the area protected, the suppression system employs extinguishing agents consisting of water, carbon dioxide, and/or Halon. The water suppression systems include the storage tanks, fire pumps (including the diesel driven fire pump fuel oil and other auxiliary systems), yard mains, hose stations and sprinkler systems. The carbon dioxide and Halon suppression systems include supply tanks or cylinders and distribution piping. Miscellaneous mechanical Fire Protection features such as self-contained breathing apparatus are also included.

FNP UFSAR References

The Fire Protection System is discussed in **FNP UFSAR Section 9.5.1**, Fire Protection System, and **Appendix 9B**, Fire Protection Program.

License Renewal Drawings

D170366L Sh. 1
D170366L Sh. 2
D170382L Sh. 1
D170384L Shts. 1, **2**, **3**, **4**, & **5**
D170385L Sh. 1 & **3**
D170386L Sh. 1
D170811L Sh. 1
D170870L Sh. 1
D170871L Sh. 1
D170891L Sh. 1
D175003L Sh. 1
D200152L Sh. 1
D205021L Sh. 1
D205048L Shts. 1, **2**, **12**, & **17**
D205049L Shts. 1, **2**, & **3**
D508562L Sh. 1
D205003L Sh. 1

Components Subject to an AMR

Portable fire protection equipment, such as fire hoses, fire extinguishers, CO2 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.

Table 2.3.3.13 Fire Protection Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Fire Hydrants	Pressure Boundary
Flexible Connectors	Pressure Boundary
Flow Orifice/Element	Flow Restriction Pressure Boundary
Fusible Links & Sprinkler Head Bulbs	Pressure Boundary
Hose Station Nozzles & Hose Connections	Pressure Boundary
Water System Piping & Valve Bodies	Pressure Boundary
Gas System Piping & Valve Bodies	Pressure Boundary
Fuel Oil System Piping & Valve Bodies	Pressure Boundary
Pump Casings	Pressure Boundary
Sight Glasses	Pressure Boundary
Spray Shield	Flow Direction
Sprinkler Heads	Pressure Boundary Flow Distribution
Strainers (element)	Debris Protection
Strainers (shell)	Pressure Boundary
Tank Protective Fiberglass Cover	Environmental Control
Water System Tanks	Pressure Boundary
Gas System Tanks	Pressure Boundary
Fuel Oil System Tanks	Pressure Boundary
Thermal Insulation (CO_2 Tank)	Environmental Control

2.3.3.14 Diesel Fuel Oil System

The Diesel Fuel Oil LRA System includes portions of the FNP Oil & Chemical Storage & Transfer System

System Description

The Diesel Fuel Oil System supplies fuel oil to the emergency diesel generators, including the AAC-designated diesel (SBO). The Diesel Fuel Oil System is a support system to the Emergency Diesel Generator System that is necessary to support continued operation of the diesel generators. The emergency diesel generators are supplied from dedicated day tanks in the Diesel Generator Building, which in turn are replenished from larger underground storage tanks.

FNP UFSAR References

The Diesel Fuel Oil System is discussed in **FNP UFSAR Section 9.5.4**, Diesel Generator Fuel Oil System.

License Renewal Drawings

D170060L Sh. 1
D170808L Sh. 1
D170808L Sh. 2
D170809L Sh. 1
D170809L Sh. 2
D200213L Sh. 1

Components Subject to an AMR

Table 2.3.3.14 Diesel Fuel Oil System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Piping	Pressure Boundary
Guard Pipe	Shelter/Protection
Pump Casings	Pressure Boundary
Strainers (element)	Debris Protection
Strainers (shell)	Pressure Boundary
Tanks	Pressure Boundary Structural Support
Valve Bodies	Pressure Boundary
Vent Screens	Debris Protection

2.3.3.15 Emergency Diesel Generator System

The Emergency Diesel Generator (EDG) LRA System consists of the FNP Emergency Diesel Generator System and the FNP Diesel and Auxiliaries System which includes the following EDG support systems:

- EDG Lube Oil System
- EDG Intercooler Water System / Air Coolant System
- EDG Jacket Coolant System
- EDG Air Start System
- EDG Air Intake and Exhaust System

System Description

The Emergency Diesel Generator System provides AC power to the on-site electrical distribution system to assure the capability for a safe shutdown in the event of a loss of off-site power. The EDG support systems are necessary to assure proper operation of the EDGs. 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 support systems heat exchangers is supplied from the FNP Service Water System (part of the OCCW LRA system).

FNP UFSAR References

The EDGs are described in **FNP UFSAR Section 8.3.1**, AC Power Systems. The EDG support systems are described in **FNP UFSAR Section 9.5.6**, Diesel Generator Starting System, and **Section 9.5.7**, Diesel Generator Lubrication System. The air exhaust system is shown on **FNP UFSAR Figure 9.4-2**, Units 1 and 2 Diesel Generator Building Equipment Location On Roof. The cooling water supply to the EDG support systems heat exchangers is discussed in **FNP UFSAR Section 9.5.5**, Diesel Generator Cooling Water System.

License Renewal Drawings

D170800L Sh. 1
D170800L Sh. 2
D170801L Sh. 1
D170801L Sh. 2
D170802L Sh. 1
D170802L Sh. 2
D170803L Sh. 1
D170803L Sh. 2
D170804L Sh. 1
D170804L Sh. 2
D170805L Sh. 1
D170805L Sh. 2
D170806L Sh. 1
D170806L Sh. 2
D170807L Sh. 1
D170807L Sh. 2
D200209L Sh. 1
D200210L Sh. 1
D200211L Sh. 1
D200212L Sh. 1
D506446L Sh. 1
D170119L Sh. 3
D200013L Sh. 3

Components Subject to an AMR

Table 2.3.3.15 Emergency Diesel Generator System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Air Accumulators	Pressure Boundary
Closure Bolting	Pressure Boundary
Ducts & Fittings	Pressure Boundary
Electric Heaters	Pressure Boundary
Equipment Frames & Housings	Pressure Boundary
Filters (casing)	Pressure Boundary
Flow Orifice/Element	Pressure Boundary
Heat Exchanger (channel head)	Pressure Boundary
Heat Exchanger (shell)	Pressure Boundary
Heat Exchanger (tube sheet)	Pressure Boundary
Heat Exchanger (tubes)	Exchange Heat Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Strainers (element)	Debris Protection
Strainers (shell)	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.16 Demineralized Water System

System Description

The Demineralized Water LRA System consists of the demineralized water portion of the FNP Condensate and Demineralized Water System. The condensate supply portion of the system (condensate storage tank) is addressed as part of the Auxiliary Feedwater LRA System (**Section 2.3.4.4**). The Demineralized Water LRA System provides demineralized water for Units 1 and 2 during all phases of plant operations. This includes water for filling, flushing, and making up losses during startup, shutdown, refueling, power, and maintenance operations.

Demineralized water makeup/supply is not required for performance of any safety-related function. Portions of the demineralized water system are brought into scope for containment isolation (where the demineralized water supply piping penetrates containment) and for paragraph 54.4(a)(2) of the Rule due to spatial interaction and attached piping.

FNP UFSAR References

The Demineralized Water Makeup System is described in **FNP UFSAR Section 9.2.3**.

License Renewal Drawings

D175047L Sh. 1
D205047L Sh. 1
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.3.16 Demineralized Water System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Filters (casing)	Pressure Boundary
Piping	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.17 High Energy Line Break Detection System

The High Energy Line Break Detection LRA System includes compartment/room pressure and level sensors assigned to the following FNP systems:

- Boron Thermal Regeneration System (BTRS)
- Liquid Waste Disposal System
- Steam Generator Blowdown (SGBD) System
- Auxiliary Steam System
- Condensate and Feedwater System
- Penetration Room Filtration (PRF) System

System Description

The High Energy Line Break Detection LRA System monitors compartment/room pressures or levels to detect high energy line breaks (HELB). The sensors alarm in the control room to alert plant operators and in most cases automatically isolate the associated high energy line(s).

Room pressure sensors monitor areas affected by a CVCS letdown line or Boron Thermal Regeneration System high energy line rupture and automatically isolate the CVCS letdown line if a HELB is detected. These sensors are assigned to FNP's BTRS and Liquid Waste Disposal System. Room pressure sensors assigned to the FNP SGBD System monitor areas affected by a steam generator blowdown line rupture and automatically isolate the steam generator blowdown line if a HELB is detected. Room pressure sensors assigned to the FNP Auxiliary Steam System monitor areas affected by a rupture of a auxiliary steam supply line to the turbine-driven auxiliary feedwater pump and alarm in the control room (no isolation feature) if a HELB is detected. Pressure sensors assigned to the PRF System monitor the penetration room to detect elevated room pressure and alarm in the control room.

Level sensors assigned to the FNP Condensate and Feedwater System are provided in the Main Steam Valve Room to detect flooding indicative of a line rupture. The level sensors trip the main feedwater pumps if the setpoint is exceeded. Tripping of the main feedwater pumps causes the feedwater isolation valves to close.

The High Energy Line Break Detection LRA System only includes the compartment/room pressure and level sensors. The components utilized to isolate specific lines are addressed as part of the associated system.

FNP UFSAR References

The High Energy Line Break Detection LRA System compartment/room pressure and level sensors are described in various sections of the high energy line break (outside containment) analysis presented in FNP UFSAR Appendix 3K: **FNP UFSAR Sections 3K.4.1.2.7**, (Feedwater and Auxiliary Feedwater Line Rupture) Flooding, **3K.4.1.6.6**, (CVCS Letdown Line Rupture) Compartment Pressurization, **3K.4.1.7.6**, (BTRS Line Rupture) Compartment Pressurization, and **3K.4.1.8**, (SGBD Line Rupture) Compartment Pressurization.

License Renewal Drawings

D175022L Sh. 1
D175033L Sh. 2
D175039L Sh. 1
D175071L Sh. 1
D175073L Sh. 1
D205022L Sh. 1
D205033L Sh. 2
D205039L Sh. 1
D205071L Sh. 1
D205073L Sh. 1

Components Subject to an AMR

Table 2.3.3.17 High Energy Line Break Detection System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	**Intended Function**
Piping	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.18 Hydrogen Control System

The Hydrogen Control LRA System includes the following FNP systems:

- Containment Hydrogen Recombiner System
- Containment Post-LOCA Air Mixing System
- Reactor Cavity Hydrogen Dilution System
- Post-Accident Containment Venting and Sampling System

System Description

The Containment Hydrogen Recombiner System consists of redundant electrical recombiners which are located inside the containment for controlling hydrogen concentrations in the containment atmosphere following a design basis accident. The recombiners' controls are located outside the containment. The recombiner units are situated in the containment such that they process a flow of containment air containing hydrogen at a concentration that is typical of the average concentration throughout the containment during accident conditions

The Containment Post-LOCA Air Mixing System consists of four fans in two redundant trains that provide mixing of the containment atmosphere to prevent localized accumulation of hydrogen gas to concentrations greater than the lower flammability limit.

The Reactor Cavity Hydrogen Dilution System consists of two redundant fans that provide mixing of the containment atmosphere with the reactor cavity to prevent localized accumulation of hydrogen gas to concentrations greater than the lower flammability limit.

The Post-Accident Containment Venting and Sampling System provides the ability to vent the containment atmosphere as a backup to the Hydrogen Recombiner System. The sampling portion of this system provides for monitoring of the containment atmosphere. Since the venting of the containment atmosphere is only as a backup to the Hydrogen Recombiner System, it is not required to mitigate the consequences of an accident. However, if it is used, the filtration function supports maintaining offsite exposure comparable to the guidelines of 10 CFR 100.11 and therefore is included in the scope of license renewal.

FNP UFSAR References

The Hydrogen Control System is discussed in **FNP UFSAR Section 6.2.5**, Combustible Gas Control In Containment.

License Renewal Drawings

D175019L Sh. 1
D175045L Sh. 1
D205019L Sh. 1
D205045L Sh. 1

Components Subject to an AMR

Table 2.3.3.18 Hydrogen Control System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Equipment Frames & Housings	Flow Direction Pressure Boundary
Filters (casing)	Pressure Boundary
Flow Orifice/Element (annubar)	Pressure Boundary Flow Restriction
Hydrogen Recombiner	Flow Direction
Piping	Pressure Boundary
Sample Analyzers (pressure retaining components)	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.19 Liquid Waste and Drains

System Description

The FNP Liquid Waste and Drains System collects, segregates, and processes reactor grade and non-reactor grade liquid wastes produced during plant operation, refueling, and maintenance activities. This system also includes the equipment and floor drainage system. Reactor grade liquid waste may be recycled for plant use or processed for disposal. Non-reactor grade liquid wastes are processed for disposal. The system is designed to control and minimize releases of radioactivity to the environment. Measurements of the rates at which various liquid waste streams accumulate and frequency of sump pump operation are used as indicators of possible system leakage.

The containment cooler condensate level monitoring subsystem is part of the Liquid Waste and Drains System and and conservatively included in the scope of License Renewal. This subsystem is credited as a means to detect reactor coolant pressure boundary leakage in the CLB, including as part of the LBB analyses. The containment cooler condensate level monitoring subsystem collects the liquid runoff from the drain pans under each containment cooler fan unit and will alarm in response to increased condensate flow indicating a potential leak in containment.

The portion of the Liquid Waste and Drains related to the reactor coolant pump oil collection system is in-scope for license renewal for fire protection. This system is designed to collect and contain oil leakage from the reactor coolant pumps to minimize the possibility of oil leakage as a fire hazard within the containment building.

The portions of the Liquid Waste and Drains LRA System that penetrates the containment boundary is brought into scope for containment isolation. Portions of the system are also brought into scope for paragraph 54.4(a)(2) of the Rule due to spatial interaction and attached piping considerations, and for isolation of drain paths to support PRF system pressure boundary requirements.

The compartment/room pressure sensors assigned to the FNP Liquid Waste and Drains System that isolate the CVCS letdown line in the event of a CVCS letdown line rupture are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

FNP UFSAR References

The Liquid Waste and Drains System is discussed in **FNP UFSAR Section 9.3.3**, Equipment and Floor Drainage System, and **Section 11.2**, Liquid Waste Systems. The containment cooler condensate level monitoring subsystem portion of the Liquid Waste and Drains System is discussed in **FNP UFSAR Section 5.2.7**, Reactor Coolant Pressure Boundary (RCPB) Leakage Detection Systems.

License Renewal Drawings

D175042L Sh. 1
D175004L Sh. 1
D205004L Sh. 1
D205042L Sh. 1
D506447L Sh. 1
D175005L Sh. 1
D205005L Sh. 1

Components Subject to an AMR

Table 2.3.3.19 Liquid Waste and Drains Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Flexible Connectors	Pressure Boundary
Piping	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary
Closure Bolting	Pressure Boundary
Floor Drain Plug	Pressure Boundary

2.3.3.20 Oil-Static Cable Pressurization System

System Description

The Oil-Static Cable Pressurization System provides pressurized oil for the Oil-Static cables that are the feeder cables from the 230 kV switchyard to the start-up auxiliary transformers. The Oil-Static Cable Pressurization System keeps a static pressure of oil on these underground cables. The oil insulates and cools the cables and minimizes cable corrosion. The Oil-Static Cable Pressurization System consists of two pumping units, with each unit having two pumps. Each pumping unit has an oil supply tank with a 1000 gallon capacity, which has a nitrogen cover gas. One pumping unit supplies the cables for start-up auxiliary transformers 1A and 2B, and the other system supplies the cables for start-up auxiliary transformers 1B and 2A. The oil static pump house in the switchyard houses the system components. The system is in-scope for license renewal because it supports operation of the offsite power supply used to recover from a station blackout event.

FNP UFSAR References

The Oil-Static Cable Pressurization System is discussed in **FNP UFSAR Section 8.2.1.2**, Switchyard.

License Renewal Drawings

D372816L Sh. 1

Components Subject to an AMR

Table 2.3.3.20 Oil-Static Cable Pressurization System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.21 Potable and Sanitary Water System

The Potable and Sanitary Water LRA System consists of the following FNP systems:

- Sanitary Water System
- Plant Hot Water Heating System

System Description

The Sanitary Water System provides chlorinated or brominated water to the plant for drinking and cleaning purposes. The Plant Hot Water Heating System carries water from the plant heating system heat exchanger to various stations within the Auxiliary Building including the air handling unit heating coils. These systems are non-safety related but are in-scope for license renewal for paragraph 54.4(a)(2) of the Rule due to spatial interaction with SR SSCs, and because portions of the Plant Hot Water Heating System are high energy as defined in **FNP UFSAR Appendix 3K**.

FNP UFSAR References

The Potable and Sanitary Water System is discussed in **FNP UFSAR Section 9.2.4**, Potable and Sanitary Water System.

License Renewal Drawings

D506447L Sh. 1

Components Subject to an AMR

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

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Heat Exchanger (channel head)	Pressure Boundary
Heat Exchanger (shell)	Pressure Boundary
Piping	Pressure Boundary
Strainers (shell)	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.22 Radiation Monitoring System

System Description

The Radiation Monitoring LRA System consists of the FNP Process and Area Radiation Monitoring Systems. The radiation monitoring systems at FNP are grouped into three (3) categories:

- Process and effluent radiological monitoring, which includes both continuous process and periodic sampling systems;
- Area radiation monitoring, which monitors radiation fields in various areas within the plant, and;
- Airborne radioactivity monitoring, which monitors specific areas of the plant to ensure that in-plant airborne radioactive materials concentrations are controlled during normal plant activities such that limits stated in 10 CFR 20 will not be exceeded.

The airborne radioactivity monitoring is a non safety-related function that is not in the scope of the License Renewal Rule. The process and effluent radiological monitoring portion of the system is used to monitor process and effluent streams during normal operations and postulated accidents to provide indication and record releases of radioactive materials generated and to initiate automatic system responses. The in-scope portions are addressed as part of the LRA system that includes the process or effluent being monitored.

Area radiation monitors are stand-alone monitors and addressed in the scoping and screening results for the Electrical and Instrumentation and Controls Systems (**Section 2.5**) along with the process and effluent radiological monitors.

FNP UFSAR References

The process and area radiation monitoring systems are discussed in **FNP UFSAR Section 11.4**, Process and Effluent Radiological Monitoring Systems, and **Section 12.2.4**, Airborne Radioactivity Monitoring.

License Renewal Drawings

None

Components Subject to an AMR

None

2.3.3.23 Reactor Makeup Water Storage System

System Description

The Reactor Makeup Water Storage System provides non-borated makeup water for the Reactor Coolant System and makeup and flushing water for various other components. The license renewal intended function of the Reactor Makeup Water Storage System is to provide an assured seismic category I make-up source to the Component Cooling Water System surge tank and to the spent fuel pool.

FNP UFSAR References

The Reactor Makeup Water Storage System is discussed in **FNP UFSAR Section 9.2.7**, Reactor Makeup Water System, and **Section 9.3.4**, Chemical and Volume Control System and Liquid Poison System. Make-up capability to the spent fuel pool is discussed in **FNP UFSAR Section 9.1.3.2**, (Spent-Fuel Pool Cooling and Cleanup System) System Description. Make-up capability to the Component Cooling Water System surge tank is discussed in **FNP UFSAR Section 9.2.2.2**, (Cooling System for Reactor Auxiliaries) System Description.

License Renewal Drawings

D175002L Sh. 1
D175036L Sh. 1
D175037L Sh. 2
D175042L Sh. 3
D175042L Sh. 11
D170118L Sh. 1
D205002L Sh. 1
D205036L Sh. 1
D205037L Sh. 2
D205042L Sh. 3
D200012L Sh. 1
D175039L Sh. 3, **4**, & **7**
D205039L Sh. 3, **4**, & **7**
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.3.23 Reactor Makeup Water Storage System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Flow Orifice/Element	Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.3.24 Sampling System

System Description

The Sampling System is designed to permit liquid and gaseous sampling for analysis and chemistry control of the plant primary and secondary system fluids. The system is designed to allow the needed samples to be obtained under normal operations and shutdown conditions. Portions of the system also support post-accident sampling.

Portions of the system that are within the scope of the License Renewal Rule support the pressure boundary function of the safety-related system being sampled, provide containment isolation where the sample system penetrates the containment boundary, and/or provide manual sampling to ensure that boration to cold shutdown margin is achieved for Appendix R safe shutdown. In addition, the sample lines for steam generator blowdown, pressurizer, and reactor coolant hot leg isolate automatically on high penetration room pressure to support maintaining the negative pressure required for the penetration room filtration function (see **Section 2.3.3.10**, Auxiliary and Radwaste Area Ventilation System).

FNP UFSAR References

The Sampling System is discussed in **FNP UFSAR Section 9.3.2**, Process Sampling Systems.

License Renewal Drawings

D175009L Shts. 1, **2**, & **3**
D205009L Sh. 1
D205009L Sh. 2
D175037L Sh. 1 & **2**
D205037L Sh. 1 & **2**

Components Subject to an AMR

Table 2.3.3.24 Sampling System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Heat Exchanger (shell)	Pressure Boundary
Heat Exchanger (tubes)	Exchange Heat, Pressure Boundary
Piping	Pressure Boundary
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 and Condensate Recovery System, **Section 2.3.4.5**
- Turbine and Turbine Auxiliaries, **Section 2.3.4.6**

2.3.4.1 Main Steam System

The Main Steam LRA System includes the following systems:

- Main Steam System
- Auxiliary Steam System
- Portions of the Feedwater Control System

System Description

The Main Steam System conducts steam from the steam generators to the turbine-generator and to supporting components, including: moisture separator reheaters, steam jet air ejectors, Gland Sealing Steam System, Auxiliary Steam System, and steam generator feed pump turbines. The Main Steam System also supplies steam via the Auxiliary Steam System to the Turbine Driven Auxiliary Feedwater Pump. The portions of the Main Steam System from each steam generator up to and including the main steam isolation valves and the supply to the Turbine Driven Auxiliary Feedwater Pump are necessary for safe shutdown of the plant and accident mitigation.

The level and flow instrumentation attached to the steam generator, although classified as part of the Feedwater Control System, has been included in the Main Steam LRA system boundary since it forms part of the Main Steam System pressure boundary and provides input to the Reactor Protection System.

The first (1st) stage turbine impulse pressure sensing lines and associated transmitters provide input to the Reactor Protection System and AMSAC circuitry (for mitigation of an ATWS event) and are included in the scope of the Main Steam System boundary.

The compartment/room pressure sensors provided in areas affected by a rupture of a auxiliary steam supply line to the turbine-driven AFW pump and assigned to the FNP Auxiliary Steam System are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

FNP UFSAR References

The Main Steam System is discussed in **FNP UFSAR Section 10.1,** Summary Description, **Section 10.3**, Main Steam Supply System and **Section 7.8**, ATWS Mitigation System Actuation Circuitry (AMSAC).

License Renewal Drawings

D175033L Sh. 1
D175033L Sh. 2
D175035L Sh. 2
D170114L Sh. 2
D200007L Sh. 1
D205033L Sh. 1
D205033L Sh. 2
D205035L Sh. 2
D506447L Sh. 1
D175007L Sh. 1
D205007L Sh. 1

Components Subject to an AMR

Table 2.3.4.1 Main Steam System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Flow Orifice/Element	Flow Restriction Pressure Boundary
Piping	Flow Direction (main steam safety and atmospheric relief valve vent stacks only) Pressure Boundary
Steam/Fluid Traps	Pressure Boundary
Turbine Pump Drive Casings	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.4.2 Feedwater System

The Feedwater LRA System includes the following FNP systems:

- Condensate and Feedwater System
- Feedwater Control System
- Chemical Injection System
- Portions of the Auxiliary Feedwater System

System Description

The Condensate and Feedwater System returns condensed steam from the main condenser through the feedwater heaters to the steam generators. The Feedwater Control System modulates the feedwater flowrate to control levels in the steam generators (SGs) during normal and transient conditions, and isolates feedwater system flow when required during abnormal conditions. The main feedwater control valves and main feedwater bypass control valves are part of the Feedwater Control System.

The Chemical Injection System allows for addition of chemicals to the feedwater fluid to minimize corrosion in the Feedwater System and in the SGs.

The portion of the AFW System that interfaces with the main feedwater lines up to and including the first isolation valve forms an integral part of the normal feedwater pressure boundary and has been included as part of the Feedwater LRA System. The remainder of the system is included in the AFW LRA System described in **Section 2.3.4.4**.

The Condensate and Feedwater System from the feedwater isolation valves to the SGs is safety related and an integral part of the Auxiliary Feedwater System (AFW) flow path pressure boundary for providing emergency feedwater to the SGs. This portion of the system and the portions of the Chemical Injection and AFW Systems that interface with the main feedwater lines up to the first isolation valves provide containment isolation and SG isolation pressure boundary functions as well as supporting the AFW flow path. Rapid and redundant isolation of the main feedwater lines to prevent sustained high flow is accomplished via tripping the main feedwater pumps and automatic closure of the main feedwater control valves and main feedwater bypass control valves in addition to closure of the feedwater isolation valves.

The level sensors provided in the Main Steam Valve Room to detect flooding indicative of a line rupture and assigned to the FNP Condensate and Feedwater System are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

FNP UFSAR References

The Feedwater System including the Feedwater Control System is discussed in **FNP UFSAR Section 10.4.7**, Condensate and Feedwater Systems. Chemical injection is discussed in **FNP UFSAR Section 10.3.5**, Water Chemistry.

License Renewal Drawings

D175000L Sh. 1
D175007L Sh. 1
D175073L Sh. 1
D205000L Sh. 1
D205007L Sh. 1
D205073L Sh. 1
D506447L Sh. 1

Components Subject to an AMR

Table 2.3.4.2 Feedwater System Component Types Subject to Aging Management Review and their Intended Functions

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

2.3.4.3 Steam Generator Blowdown System

System Description

The Steam Generator Blowdown (SGBD) System provides a continuous “blowdown” (i.e., removal) of water from the lower portion of each steam generator tube bundle to remove solids and chemical contaminants that accumulate in the steam generators (SGs) during normal operations. Removing these impurities helps maintain proper water chemistry and minimizes corrosion on the secondary side of the steam generators. The blowdown from each SG flows under pressure into a common manifold and then to a heat exchanger where the temperature is reduced prior to processing the effluent.

Portions of the SGBD System are brought into scope for containment isolation (where the SGBD piping penetrates containment) and as a result of the potential for spatial interaction with safety-related SSCs (under 10 CFR 54.4(a)(2) of the Rule). The SGBD lines from the steam generators to the processing system are high energy lines. High energy line break room pressure sensors isolate blowdown from the SGs if a rupture is detected. The compartment/room pressure sensors are addressed separately as part of the High Energy Line Break Detection LRA System boundary (**Section 2.3.3.17**).

FNP UFSAR References

The Steam Generator Blowdown System is discussed in **FNP UFSAR Section 10.4.8**, Steam Generator Blowdown Processing System.

License Renewal Drawings

D175071L Sh.1 **D175009L Sh. 2**
D205071L Sh.1 **D205009L Sh. 2**
D506447L Sh. 1

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

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

2.3.4.4 Auxiliary Feedwater System

The Auxiliary Feedwater LRA System includes the following FNP systems:

- Auxiliary Feedwater System
- Condensate Storage Tank portion of the Condensate and Demineralized Water Transfer and Storage System

System Description

The Auxiliary Feedwater (AFW) System is designed to supply feedwater to the steam generators (SGs) during start up, cooldown and emergency conditions. Two (2) motor-driven and one turbine-driven AFW pump 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 Condensate and Demineralized Water Transfer and Storage System stores water in the Condensate Storage Tank (CST) to provide makeup and surge capacity to compensate for changes in the turbine plant systems inventory and to provide a supply of water for the Auxiliary Feedwater System for shutdown decay heat removal. The lower portion of the tank is designed to ensure that 150,000 gallons remain in the tank for emergency use. The demineralized water transfer and storage portion of the system is addressed as part of the Demineralized Water LRA System (**Section 2.3.3.16**).

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 and therefore the SCs that perform this function are safety-related. The feedwater source for the AFW System for normal and design basis event mitigation is from the CST. The FNP Service Water System can also be used to supply the AFW System if needed, however this is not credited for mitigation of any design basis event.

FNP UFSAR References

The Auxiliary Feedwater System is discussed in **FNP UFSAR Section 6.5**, Auxiliary Feedwater System. The CST is discussed in **FNP UFSAR Section 9.2.6**, Condensate Storage Facilities.

License Renewal Drawings

D170117L Sh. 2
D175007L Sh. 1
D200011L Sh. 1
D205007L Sh. 1
D506447L Sh. 1
D175033L Sh. 2
D170118L Sh. 1
D205033L Sh. 2
D200012L Sh. 1

Components Subject to an AMR

Table 2.3.4.4 Auxiliary Feedwater System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Closure Bolting	Pressure Boundary
Filters (casing)	Pressure Boundary
Flow Orifice/Element	Flow Restriction, Pressure Boundary
Oil Cooler (shell)	Pressure Boundary
Oil Cooler (channel head)	Pressure Boundary
Oil Cooler (tube sheet)	Pressure Boundary
Oil Cooler (tubes)	Exchange Heat, Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Condensate Storage Tanks	Pressure Boundary
Valve Bodies	Pressure Boundary

2.3.4.5 Auxiliary Steam and Condensate Recovery System

System Description

The Auxiliary Steam and Condensate Recovery LRA System supplies steam for various heating and system loads in the Auxiliary and Turbine Buildings and provides a method of collecting and pumping the condensate from those steam loads back to the Turbine Building. Steam is drawn from the Main Steam System. An auxiliary steam generator was included as part of the original plant design to supply steam when neither unit was capable of supplying steam but is no longer operational. In the Auxiliary Building, steam is supplied for loads such as the recycle evaporator and the plant hot water heat exchanger. Condensate from the Auxiliary Building is processed via the Turbine Building drains. The Auxiliary Steam and Condensate Recovery System is non safety-related.

The Auxiliary Steam and Condensate Recovery LRA System is in-scope for license renewal (under 10 CFR 54.4(a)(2) of the Rule for spatial interaction with SR SSCs and because portions of the system are high energy as defined in **FNP UFSAR Appendix 3K**.

FNP UFSAR References

The Auxiliary Steam and Condensate Recovery System is discussed in **FNP UFSAR Sections 10.2.2,** (Turbine-Generator) Description, and **Appendix 3K**, High-Energy Line Pipe Break (Outside Containment).

License Renewal Drawings

D506447L Sh. 1

Components Subject to an AMR

Table 2.3.4.5 Auxiliary Steam and Condensate Recovery System Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Valve Bodies	Pressure Boundary
Piping	Pressure Boundary
Pump Casings	Pressure Boundary
Strainers (shell)	Pressure Boundary
Closure Bolting,	Pressure Boundary
Tanks	Pressure Boundary

2.3.4.6 Turbine and Turbine Auxiliaries

System Description

The steam turbine is a machine that 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 (EH) control subsystem. The turbine auxiliaries include the moisture separator reheaters (MSRs), extraction and reheat steam, gland sealing steam, and the turning gear for rolling the turbine at very low speeds when steam is unavailable. Also included in the turbine auxiliaries is the Turbine Lube Oil System which includes the both the lubricating oil and auto-stop oil subsystems.

Steam is supplied to the high pressure (HP) turbine via four parallel flow paths, and each path is equipped with a throttle valve and a governor valve. Two turbine throttle and two governor valves form a single assembly. Extraction steam from the HP turbine provides moisture removal and is used for reheating the steam flow before it is supplied to the two (2) low pressure (LP) turbines. Steam exiting the HP turbine is passed through the MSRs where it is reheated. The reheat steam is then supplied to two (2) LP turbines via four parallel paths, and each path is equipped with a reheat stop valve and a reheat intercept valve.

The Turbine Control System positions the steam valves controlling steam flow to the HP and LP turbines (i.e., HP throttle and governor valves, and reheat stop and intercept valves). The EH subsystem 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. Dumping the auto-stop oil header pressure or the EH fluid pressure to the actuators will close the steam valves (tripping the turbine).

The non safety-related SCs of the Turbine and Turbine Auxiliaries that are required to trip the turbine in response to an ATWS event and in response to a turbine overspeed event are conservatively included in the scope of License Renewal for FNP. The turbine overspeed trip reliability is an input to the turbine missile probability analysis that demonstrates the adequacy of the FNP design, therefore the SCs that perform this function are conservatively included in the scope of License Renewal for FNP under 10 CFR 54.4(a)(2) of the Rule.

FNP UFSAR References

The Steam Turbine and Turbine Auxiliaries are discussed in **FNP UFSAR Sections 10.1**, Summary Description, and **10.2**, Turbine-Generator. Gland sealing steam is discussed in **FNP UFSAR Section 10.4.3**, Turbine gland sealing system. ATWS mitigation is discussed in **FNP UFSAR Section 7.8.**

License Renewal Drawings

None

Components Subject to an AMR

There are no mechanical components of the Turbine and Turbine Auxiliaries 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 Steam Turbine System components do not perform any intended functions for License Renewal; therefore, none of the Turbine and Turbine Auxiliaries components are subject to an aging management review.

2.4 SCOPING AND SCREENING RESULTS: CONTAINMENTS, STRUCTURES, AND COMPONENT SUPPORTS

The determination of structures within the scope of license renewal is made by identifying FNP structures and determining which ones satisfy one or more criteria contained in 10CFR 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 Structure **Section 2.4.1**
- Other Structures, **Section 2.4.2**
- Component Supports, **Section 2.4.3**

2.4.1 CONTAINMENT STRUCTURE

The containment is a Class 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 structure provides protection for these features from external events (e.g., tornado, etc.) and functions as a fission product barrier following an accident inside the containment. It ensures that an acceptable upper limit for leakage of radioactive materials to the environment will not be exceeded even if gross failure of the reactor coolant system occurs. The structure also provides biological shielding during normal operation and following a LOCA. Also, tThe containment structure includes components required for reactor refueling. This includes the polar crane, refueling cavity, and portions of the fuel handling system. The structure provides biological shielding during normal operation and following a LOCA. It also provides a fission product barrier following an accident inside the containment.

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 canal, and floor slabs. The major steel internal components are the RCS supports, refueling canal liner, steel framing, miscellaneous platforms, pipe whip restraints, and supports for cable trays, conduits, ventilation ducting, piping, and other components.

A spaces approach is used for scoping and screening of the structures and structural components located inside the containment structure. Support elements located in the Containment Building, such as pipe supports, electrical raceways and their supports, HVAC supports, miscellaneous platforms, etc. are in scope for license renewal irrespective of safety designation or design classification. Scoping and screening of these support elements is discussed in **Section 2.4.3**.

The major elements of the containment structure are discussed in the following sections:

- Structure and Foundation **Section 2.4.1.1**
- Steel Liner Plate **Section 2.4.1.2**
- Penetrations **Section 2.4.1.3**
- Containment Internal Structures **Section 2.4.1.4**

2.4.1.1 Structure and Foundation

The containment structure is a pre-stressed, reinforced concrete cylindrical structure with a shallow domed roof and a reinforced concrete foundation slab with provision for a reactor cavity at the center. The cylindrical portion of the structure is pre-stressed by a post tensioning system composed of horizontal and vertical tendons. The dome has a three-way pattern of criss-crossing tendons. The concrete foundation is a conventionally reinforced mat, bearing directly on the Lisbon formation. A tendon access gallery (not in the scope of license renewal) is located beneath the perimeter of the base slab for the installation and inspection of the vertical tendons.

2.4.1.2 Steel Liner Plate

A ¼" thick 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. The liner plate is anchored to the concrete structure for stability. At all penetrations, the liner plate is thickened to reduce stress concentration. Insert plates are provided in the liner to transfer concentrated loads to the wall, slab, and dome.

2.4.1.3 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. The process pipe or cable feed-through assembly passes through the sleeve and is seal welded to the sleeve via an appropriate adapter. Additional detail is provided below.

Fuel Transfer Tube

A fuel transfer tube penetrates the containment wall connecting the refueling canal in containment with the fuel transfer canal in the Auxiliary Building. This penetration consists of a pipe installed inside a sleeve. The tube is sealed to the steel liners in both the refueling canal and fuel transfer canal. The tube is closed with a blind flange on the containment side and a gate valve on the Auxiliary Building side. Expansion joint bellows provide for relative movement between containment and the Auxiliary Building structures.

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. The hatch cover is sealed using a double-gasketed flanged design.

Personnel Access Locks (Airlocks)

Two airlocks penetrate the containment wall; a personnel access lock and an auxiliary access lock. 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.

Mechanical Penetrations

Piping penetrations consist of a sleeve around the outside of the piping where it passes through the containment boundary. The piping is welded to a flued head, which is welded to the pipe sleeve. The sleeve is welded to the containment liner plate. Containment ECCS sump recirculation pipes are seal welded to the liner plate via a steel adapter plate.

Instrumentation penetrations consist of a sleeve that passes through the containment boundary. The sleeve is welded to the containment liner plate, and a cap is welded to the sleeve inside containment. Instrumentation lines that pass through the penetration are welded to the cap.

Spare penetrations consist of a sleeve which passes through the containment boundary. The sleeve is welded to the containment liner plate, and a cap is welded to the sleeve inside containment.

Electrical Penetrations

Electrical penetrations consist of a sleeve that passes through the containment boundary. The sleeve is welded to the containment liner plate. A cable feed-through assembly is inserted in the sleeve and welded to the sleeve inside containment for Conax and GE type penetrations. The feed-through assembly is screwed to the clip angle for a Westinghouse type penetration.

2.4.1.4 Containment Internal Structures

Concrete

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.

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.

During operation, a concrete slab is installed above the reactor head to provide missile and biological shielding.

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. Access openings are provided above each reactor coolant pump. Concrete plugs are provided to close the access openings during operation.

Steel

The steel provides support for various safety related and non safety-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.

Refueling Canal

The refueling canal is a reinforced concrete structure, lined with stainless steel, which 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.

Reactor Coolant System Supports

RCS supports are addressed in **Section 2.4.3**, Component Supports

Miscellaneous Items

Included in this group are the containment ECCS and CS sump recirculation line suction screens which provide debris protection for the RHR/LHSI and containment spray pumps. Also included are 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.

FNP UFSAR References

The Containment Structure, including the Steel Liner Plate, Equipment Hatch, Personnel Access Locks, and Electrical Penetrations are discussed in **FNP UFSAR Section 3.8.1,** Concrete Containment; **Section 3.8.3,** Internal Structures, and **Section 3.8.5,** Foundations and Concrete Supports. The ECCS and CS sump screens are discussed in **Section 6C,** Containment Sump Description and Emergency Core Cooling System Recirculation Mode Test Program. The TSP baskets are discussed in **Section 6.2.3.4.1,** ECCS Recirculation Sump pH Control System.

The Fuel Transfer Tube is discussed in **FNP UFSAR Section 3.8.4.1** and **Section 9.1.4.2**.

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Components Subject to an AMR

Table 2.4.1 Containment Structure Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Concrete Elements: Above Grade - Dome; wall; ring girder; buttresses	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Radiation Shielding Shelter / Protection Structural Support
Concrete Elements: Below Grade - wall; buttresses	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Radiation Shielding Shelter / Protection Structural Support
Concrete Elements: Foundation; subfoundation	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Radiation Shielding Shelter / Protection Structural Support
Concrete: Internal Structures	Heat Sink Missile Barrier NSR Structural Support Shelter / Protection Structural Support
Fuel Transfer Tube	Shelter / Protection Structural Support

Table 2.4.1 (cont'd) Containment Structure Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Internal Structure: Steel Liners	Fission Product Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support
Penetration Sleeves, Penetration bellows	Fission Product Barrier Pressure Boundary Structural Support
Personnel Airlock and Equipment Hatch	Missile Barrier Radiation Shielding Pressure Boundary Fission Product Barrier Fire Barrier
Prestressing System: Tendons; Anchorage Components	Structural Support
Seals, Gaskets and Moisture Barriers	Fission Product Barrier Radiation Shielding
Steel Components: All structural steel	NSR Structural Support Shelter / Protection Structural Support
Steel Components: Refuel Cavity & Transfer Canal Misc. Steel	HE/ME Shielding NSR Structural Support Pipe whip Restraint Shelter / Protection Structural Support
Steel elements: Liner; liner anchors; integral attachments	Fission Product Barrier Pressure Boundary Structural Support

Table 2.4.1 (cont'd) Containment Structure Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Sump Trash Rack	Debris Protection Structural Support
Tri-Sodium Phosphate Basket	Structural Support

2.4.2 OTHER STRUCTURES

Other structures are discussed in the following sections:

- Auxiliary Building, **Section 2.4.2.1**
- Diesel Generator Building, **Section 2.4.2.2**
- Turbine Building, **Section 2.4.2.3**
- Utility/Piping Tunnels, **Section 2.4.2.4**
- Water Control Structures, **Section 2.4.2.5**
- Steel Tank Structures (Foundations and Retaining Walls), **Section 2.4.2.6**
- Yard Structures, **Section 2.4.2.7**

2.4.2.1 Auxiliary Building

The auxiliary Auxiliary buildings Buildings are reinforced concrete multi-floor structures located adjacent to their respective containment buildings. The Containment and the Auxiliary Building for each unit are separated by a seismic expansion joint, preventing the two structures from impacting each other during an earthquake. 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 foundation is a reinforced concrete slab, bearing directly on the Lisbon formation. The Auxiliary Building for each unit houses the following major plant facilities such as new fuel and spent fuel handling, and storage, control room and related facilities, Chemical and Volume Control System, ESF systems, Radwaste System, Penetration Rooms, and access control area.

The Fuel Storage Facility 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 wash area, and rooms containing supporting equipment. The Fuel Storage Facility is an integral part of the Auxiliary Building.

The Spent Fuel Pool (SFP) is designed for underwater storage of spent fuel assemblies after their removal from the reactor. Fuel assemblies are transported using the spent fuel pool bridge crane. 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. The fuel transfer canal is separated from the SFP by a removable gate. 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 New Fuel Storage Area is adjacent to the SFP, but is a separate area designed for dry storage of new fuel assemblies prior to transfer into the SFP.

A spaces approach is used for scoping and screening of the structures and structural components located inside the Auxiliary Building. Support elements located in the Auxiliary Building, such as pipe supports, electrical raceways and their supports, HVAC supports, miscellaneous platforms, etc. are in scope for license renewal irrespective of safety designation or design classification. Scoping and screening of these support elements is discussed in **Section 2.4.3**.

FNP UFSAR References

The Auxiliary buildings are discussed in **FNP UFSAR Section 2B.6.3,** Auxiliary Buildings; **Section 3.8.4.1**, Description of the Structures, and **Section 3.8.5,** Foundations and Concrete Supports.

The Fuel Storage Facility is discussed in **FNP UFSAR Section 9.1,** Fuel Storage and Handling. The Refueling Canal is discussed in **FNP UFSAR Section 3.8.3**, Internal Structures.

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Components Subject to an AMR

Table 2.4.2.1 Auxiliary Building Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Compressible Joints and Seals	Shelter / Protection
Concrete: Exterior above grade	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support
Concrete: Exterior below grade	Shelter / Protection Structural Support Fire Barrier NSR Structural Support
Concrete: Foundation	Fire Barrier NSR Structural Support Shelter / Protection Structural Support
Concrete: Interior	Fire Barrier Flood Barrier NSR Structural Support Shelter / Protection Structural Support
Concrete: Roof slab	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support
Non-Fire Doors	Missile Barrier Shelter / Protection

Table 2.4.2.1 (cont'd) Auxiliary Building Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Fire Doors	Fire Barrier Shelter / Protection Structural Support
Fire Seals	Fire Barrier
Masonry Walls: All	Fire Barrier NSR Structural Support Shelter / Protection Structural Support
New Fuel Storage Racks: Storage Rack Assembly	NSR Structural Support Shelter / Protection Structural Support
Penetration Sleeves	NSR Structural Support Shelter / Protection Structural Support
Spent Fuel Storage Racks: Storage Racks	NSR Structural Support Shelter / Protection Structural Support
Steel Components: All structural steel	NSR Structural Support Structural Support
Steel Components: Liners	NSR Structural Support Shelter / Protection Structural Support

2.4.2.2 Diesel Generator Building

The Diesel Generator Building is a single, reinforced concrete building housing the diesel generators and associated auxiliary equipment and is a one-story, box-type structure. The foundation is a thick reinforced concrete base slab supported by concrete caissons and is structurally separated from the electrical cable tunnels by free joints. Reinforced concrete internal walls, including fire doors, embedments, and dampers, provide physical separation for the five diesel-generators and associated equipment and components, including protection against internal flooding, oil or fuel spills, and the spread of fires.

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. The Diesel Generator Building is a Seismic Category I structure, designed to withstand the various combination of loads as defined in the FNP UFSAR.

A spaces approach is used for scoping and screening of the structures and structural components located inside the Diesel Generator Building. Support elements located in the Diesel Generator Building, such as pipe supports, electrical raceways and their supports, ventilation supports, miscellaneous platforms, etc. are in scope for license renewal irrespective of safety designation or design classification. Scoping and screening of these support elements is discussed in **Section 2.4.3**.

FNP UFSAR References

The Diesel Generator Building is discussed in **FNP UFSAR Section 2B.6.5,** Diesel Generator Building; **FNP UFSAR Section 3.8.4.1**, Description of the Structures, and **Section 3.8.5**, Foundations and Concrete Supports.

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Components Subject to an AMR

Table 2.4.2.2 Diesel Generator Building Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Compressible Joints and Seals	Shelter/Protection
Concrete: Exterior above grade	Fire Barrier Missile Barrier NSR Structural Support Shelter/Protection Structural Support
Concrete: Foundation	NSR Structural Support Shelter/Protection Structural Support
Concrete: Interior	Fire Barrier NSR Structural Support Shelter/Protection Structural Support
Concrete: Roof slab	Fire Barrier Missile Barrier NSR Structural Support Shelter/Protection Structural Support
Non-Fire Doors	Missile Barrier NSR Structural Support Shelter/Protection Structural Support
Fire Doors	Fire Barrier Shelter/Protection
Fire Seals	Fire Barrier Shelter/Protection

Table 2.4.2.2 (cont'd) Diesel Generator Building Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Masonry Walls: All	Fire Barrier NSR Structural Support Shelter/Protection Structural Support
Penetration Sleeves	NSR Structural Support Shelter/Protection Structural Support
Steel Components: All structural steel	NSR Structural Support Shelter/Protection Structural Support

2.4.2.3 Turbine Building

The Turbine buildings are two separate reinforced concrete and steel frame structures, oriented end-to-end and multi-floored. The buildings house the main turbines, condensers, generators and associated auxiliaries. The base slab is a thick reinforced concrete slab supported by reinforced concrete caissons. Thick, exterior below grade reinforced concrete walls project from the base slab at El. 137’-0” to El. 155'-0", six inches above grade. A reinforced concrete parapet wall projects from El. 155'-0" to El. 165'-0". Concrete slabs form the floors of elevations 155’-0”, 189’-0” and 265’0”, as well as various platforms. A superstructure steel frame projects from the base slab to the roof at El. 265'-0". Metal siding panels are attached to the steel frame above the parapet wall.

The Turbine Building is a non-safety-related structure; however, the portion of the Turbine Building that is adjacent to the Auxiliary Building has been designed for tornado wind loading to prevent its collapse on the Auxiliary Building.

The primary function of the Turbine Building is to house the turbine generators. The functional requirement of the building in the event of an earthquake or tornado is that no portion of the building collapses and results in damage to Seismic Category I structures. Therefore, the main structural features such as exterior walls, floor slabs, and foundations are in scope for license renewal. In addition, support features for ATWS, SBO, and fire protection safe shutdown equipment located in the Turbine Building are also in scope. Support components are listed in **Section 2.4.3**.

FNP UFSAR References

The Turbine Building is discussed in **FNP UFSAR Section 2B.6.9,** Non-Category 1 Structures

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Components Subject to an AMR

Table 2.4.2.3 Turbine Building Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Concrete: Exterior above grade	NSR Structural Support Shelter/Protection
Concrete: Exterior below grade	NSR Structural Support Shelter/Protection
Concrete: Foundation	NSR Structural Support Shelter/Protection
Concrete: Interior	NSR Structural Support Shelter/Protection
Concrete: Roof slab	NSR Structural Support Shelter/Protection
Steel Components: All Structural Steel	NSR Structural Support Shelter/Protection

2.4.2.4 Utility/Piping Tunnels

Utility/piping tunnels includes in scope electrical cable tunnels, duct banks, and valve and pull boxes.

The Electrical Cable Tunnels are comprised of four reinforced concrete, rectangular shaped structures that enclose electrical cables routed between the Diesel Generator Building and the two Auxiliary Buildings. The tunnels are located below ground and protect electrical cables required for safe shutdown from design basis seismic events, flooding, tornadoes and missiles.

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 non safety-related duct runs related to SBO and fire protection [e.g., duct runs for high voltage switchyard and fire protection pump house].

Valve boxes and pull boxes are rectangular reinforced concrete pull boxes with steel or aluminum covers for safety related and aluminum covers for non safety-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.

A spaces approach is used for scoping and screening of the structures and structural components located inside the in scope utility/piping tunnels and boxes. Support elements such as pipe supports, electrical raceways and their supports, etc. are in scope for license renewal irrespective of safety designation or design classification. Scoping and screening of these support elements is discussed in **Section 2.4.3**.

FNP UFSAR References

The Cable Tunnels are discussed in **FNP UFSAR Section 3.8.4.1,** Description of the Structures, and **Section 3.8.5**, Foundations and Concrete Supports.

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Components Subject to an AMR

Table 2.4.2.4 Utility/Piping Tunnel Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Compressible Joints and Seals	Shelter/Protection
Concrete: Exterior above grade	NSR Structural Support Shelter/Protection Structural Support
Concrete: Exterior below grade	NSR Structural Support Shelter / Protection Structural Support
Structural Steel	NSR Structural Support Structural Support

2.4.2.5 Water Control Structures

The water control structures in the scope of License Renewal include the Service Water Intake Structure, Discharge Structure, Storage Pond Earthen Embankment, and Storage Pond Spillway Structure.

Service Water Intake Structure

The Service Water Intake Structure (SWIS) is located away from the main power block at the storage pond. The SWIS is a Category I, reinforced concrete, box-type structure which houses the Service Water pumps, wetwell, and traveling screens for both units. The structure has a reinforced concrete caisson foundation.

The primary function of the SWIS is to house the service water pumps and associated equipment needed to supply cooling water for design basis events. The SWIS is a Seismic Category I structure, designed to withstand the various combination of loads as defined in the FNP UFSAR.

A spaces approach is used for scoping and screening of the structures and structural components located inside the Diesel Generator Building. Support elements located in the Diesel Generator Building, such as pipe supports, electrical raceways and their supports, ventilation supports, miscellaneous platforms, etc. are in scope for license renewal irrespective of safety designation or design classification. Scoping and screening of these support elements is discussed in **Section 2.4.3**.

Discharge Structure

The Discharge Structure is a reinforced concrete, rectangular basin located by the storage pond. The primary function of the Service Water Discharge Structure is to release service water into the service water pond. The functional requirement of the Service Water Discharge Structure during and following a design basis event is to maintain integrity to prevent in an interruption of service water discharge.

Storage Pond Earthen Embankment

The storage pond serves as the plant's ultimate heat sink by providing adequate cooling water to the service water system to support the simultaneous safe shutdown and cooldown of both units. The ultimate heat sink is capable of providing sufficient cooling for at least 30 days, to permit simultaneous safe shutdown and cooldown of both nuclear reactor units and to maintain them in a safe shutdown condition or, in the event of an accident in one unit, to permit safe control of the accident and simultaneously permit safe shutdown and cooldown of the other unit and maintain it in a safe shutdown condition.

During normal operation it is a reservoir for water pumped from the river prior to its use in the plant. The pond is contained by an earthen dam and dikes. The storage pond dam and dikes are Seismic Category I and are designed to satisfy the intent of Regulatory Guide 1.27.

The primary function of the earthen structures is to form the service water pond, which provides water system under normal and emergency conditions. The functional requirement is that no dam or embankment failure would result in a loss of cooling water to the service water system.

Storage Pond Spillway Structure

The storage pond spillway structure is a reinforced concrete three-bay culvert bridge built to allow the plant access road to cross the spillway. This spillway is an uncontrolled spillway designed to discharge excess water from the pond in order towhile maintaining the required pond water level needed for ultimate heat sink function.

FNP UFSAR References

The Service Water Intake Structure is discussed in **FNP UFSAR Section 3.8.4.1,** Description of the Structures, and **Section 3.8.5,** Foundations and Supports. The Storage Pond, Earthen Embankment, Spillway Structure and Discharge Structures are discussed in **FNP UFSAR Section 2.4.8.1,** Reservoirs; **Section 2B.7.6** and **Section 2B.6.7,** Storage Pond; and **Section 2B.6.8,** Pond Spillway Structure; **Section 2B.6.4,** Cooling Water System Lines and Facilities.

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Components Subject to an AMR

Table 2.4.2.5 Water Control Structures Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Concrete: Exterior above grade	Missile Barrier NSR Structural Support Shelter/Protection Structural Support
Concrete: Exterior below grade	NSR Structural Support Shelter/Protection Structural Support
Concrete: Foundation	NSR Structural Support Shelter/Protection Structural Support
Concrete: Interior	Fire Barrier Flood Barrier NSR Structural Support Shelter/Protection Structural Support

Table 2.4.2.5 (cont'd) Water Control Structures Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Concrete: Roof slab	Missile Barrier, NSR Structural Support Shelter/Protection, Structural Support
Non-Fire Doors	Shelter/Protection Structural Support
Earthen water-control structures: Dams, embankment	Flood Barrier Heat Sink
Fire Doors	Fire Barrier Shelter/Protection
Fire Seals	Fire Barrier
Masonry Walls: All	Fire Barrier NSR Structural Support Shelter/Protection Structural Support
Steel Components: All structural steel	NSR Structural Support Structural Support
Stop Logs	NSR Structural Support
Traveling Screen	Debris Protection NSR Structural Support

2.4.2.6 Steel Tank Structures (Foundations and Retaining Walls)

This evaluation only applies to the tank foundations, retaining walls, or other structural support components. The tanks themselves are evaluated with the applicable mechanical systems. The functions that bring the tanks into scope for license renewal are discussed in the associated mechanical system description.

The tanks evaluated include the Condensate Storage Tank (CST), Reactor Make-up Water Storage Tank (RMWST), Refueling Water Storage Tank (RWST), Emergency Diesel Generator Fuel Oil Storage Tanks, Fire Protection Diesel Pump Fuel Oil Storage Tanks, and Fire Protection Water Storage Tanks. Each unit has a dedicated CST, RMWST, and RWST. There are five interconnected emergency diesel generator fuel oil storage tanks. Each diesel driven fire pump has a dedicated fuel oil storage tank. The Fire Protection Water Storage Tanks are shared between the two units.

Condensate Storage Tank Foundation

The Condensate Storage Tank is a 500,000 gallon carbon steel tank on a reinforced concrete foundation. The bottom twelve feet of the tank walls is reinforced to resist tornado-generated missiles. The CST provides makeup and surge capacity for the turbine water cycle, and also provides reserve supply to the Auxiliary Feedwater System for shutdown decay heat removal.

The primary function of the Condensate Storage Tank foundation is to support the nuclear safety-related Condensate Storage Tank. The functional requirement of the foundation during and following a design basis event is that its failure would not result in a loss of the Condensate Storage Tank contents.

Reactor Make-up Water Storage Tank Foundation

The Reactor Make-up Water Storage Tank is a 200,000 gallon carbon steel tank on a reinforced concrete foundation. A shield and retaining wall is provided to safeguard the water in the tank. The RMWST provides makeup water for the Reactor Coolant System.

Refueling Water Storage Tank Foundation

The Refueling Water Storage Tank is a 500,000 gallon carbon steel tank on a reinforced concrete foundation. A shield and retaining wall is provided to safeguard the water in the tank. 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.

Emergency Diesel Generator Fuel Oil Storage Tank Foundations

The Emergency Diesel Generator Fuel Oil Storage Tanks are 40,000 gallon, seismic category I underground tanks. The tanks are supported by poured concrete and buried for protection. These tanks transfer fuel oil to the day tanks (interior to the EDG Buildings) which in turn supply fuel oil to the emergency diesel generators.

Fire Protection Diesel Pump Fuel Oil Storage Tank Foundations

Two diesel driven fire pumps are installed to ensure adequate pressure in the fire protection water systems. Each pump has a fuel oil storage tank located adjacent to the Fire Protection Pump House on its south side. The tanks are horizontal cylindrical tanks made of steel plate. Each tank is supported on four pedestals, on a common concrete slab on grade.

Fire Protection Water Storage Tank Foundations

Two 300,000 gallon Fire Protection Water Storage Tanks are located adjacent to the Fire Protection Pump House. The fire protection tanks are vertical cylindrical, flat bottom tanks made of steel plate. The tanks are supported on a 1'-6" thick concrete foundation with edge beam.

FNP UFSAR References

The Condensate Storage Tank is discussed in **FNP UFSAR Section 3.8.4.1,** Description of the Structures; and **Section 3.8.5,** Foundations and Concrete Supports.

The Reactor Makeup Water Storage Tank is discussed in **FNP UFSAR Section 3.8.4.1,** Description of the Structures; **Section 3.8.5,** Foundations and Concrete Supports; and **Section 9.2.7,** Reactor Make-up Water System.

The Refueling Water Storage Tank is discussed in **FNP UFSAR Section 3.8.4.1,** Description of the Structure; **Section 3.8.5,** Foundations and Concrete Supports; **Section 6.2.2,** Containment Heat Removal Systems; and **Section 6.3,** Emergency Core Cooling System.

The Emergency Diesel Generator Fuel Oil Storage Tanks are discussed in **FNP UFSAR Section 9.5.4,** Diesel Generator Fuel Oil System.

The Diesel Driven Fire Pumps Storage Tanks and the Fire Protection Water Storage Tanks are discussed in **FNP UFSAR Section 9B.4.2.1,** Water Supply Storage and Distribution System.

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Components Subject to an AMR

Table 2.4.2.6 Steel Tank Structures (Foundations and Retaining Walls) Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Bolting	NSR Structural Support Shelter/Protection Structural Support
Concrete Pedestal	NSR Structural Support Shelter/Protection
Concrete: Exterior above grade (shield and retaining walls)	Flood Barrier NSR Structural Support Shelter/Protection Structural Support
Concrete: Foundation	Shelter/Protection Structural Support
Steel Components: All structural steel	NSR Structural Support Shelter/Protection Structural Support

2.4.2.7 Yard Structures

Yard structures in the scope of license renewal for FNP include portions of the low voltage switchyard and high voltage switchyard, the Fire Protection Pump House, and each unit's plant vent stack, Low Level Radwaste Building, and the Solidification/Dewatering Facility. This evaluation only applies to in scope structural elements such as the equipment foundations, building foundations or other structural support components. The fire pumps are evaluated with Fire Protection in **Section 2.3.3.13**. The switchyard electrical components are evaluated in **Section 2.5.1**. The plant vent stacks are evaluated as part of the Auxiliary and Radwaste Ventilation System in **Section 2.3.3.10**.

Switchyard

The switchyard is divided into two major sections: high voltage and low voltage. 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 low voltage switchyard is adjacent to the Turbine Buildings. The main power, unit startup, and unit auxiliary transformers are located in the low voltage switchyard. The high and low voltage switchyards are connected by both overhead and underground cables. The switchyard is in the scope of license renewal to support recovery from a SBO event. High voltage switchyard evaluation includes oil static houses, switch house and 4kv switchgear.

The structural elements of the switchyard in 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 (230kV portion) this includes: supports, bolting and foundation for the Oil-Static Pressurization System located in the Oil Static Houses; Switch House foundation, and 4 kV switchgear pad. In the Low Voltage Switchyard this includes: the startup transformer foundation, steel frames, and support towers.

Fire Protection Pump House

The Fire Protection Pump House provides structural support, fire barrier separation, and environmental protection for the fire pumps and their auxiliary components. The Fire Protection Pump House is a single-story metal sided building on a concrete slab. The fire protection features of this building support FNP's 10CFR 50.48 compliance. Therefore, only the fire protection features including fire rated block walls, equipment pedestal and concrete foundation of the building are in scope of license renewal.

Plant Vent Stack

The Plant Vent Stack is the primary release point of gaseous waste. Filtered exhaust streams from radwaste area ventilation systems are released to the environment through the vent stack. The vent stack is a Seismic Category I structure that is not required for safe shutdown. In addition, the vent stack is not relied upon as an elevated release point; ground level release is assumed in the FNP UFSAR Chapter 15 dose analyses. The vent stack is a non safety-related structure but its function is to maintain its structural integrity during a design basis event such that it does not impact other SR structures or components.

Low Level Radwaste Storage Building

The Low Level Radwaste Storage Building located outside of the Auxiliary Building has been constructed to supplement the plant's storage capabilities. The building is used as a storage point for dry active waste as well as a loading facility for shipment of dry active waste. The Low Level Radwaste Storage Building is a non safety-related single-story concrete walled and steel column building on a concrete slab. Only the fire protection features of the building are in scope of license renewal. The fire protection features minimize radioactive releases to the environment in the event of a fire and therefore conservatively support FNP's 10CFR 50.48 compliance.

Solidification/Dewatering Facility

The Solidification and Dewatering Facility consists of a building with shielded pits and process lines located east of the Unit 1 Auxiliary Building. This facility is capable of receiving waste from either unit. The solidification and dewatering facility is a non safety-related single-story metal sided building on a concrete slab. Only the fire protection features including fire rated block walls of the building are in scope of license renewal. The fire protection features minimize radioactive releases to the environment in the event of a fire and therefore conservatively support FNP's 10CFR 50.48 compliance.

FNP UFSAR References

The Switchyard is discussed in **FNP UFSAR Section 8.2.1,** System Description.

The Fire Protection Pump House is discussed in **FNP UFSAR Section 9B.4.2.1,** Water Supply Storage and Distribution System.

The Plant Vent Stack is discussed in **FNP UFSAR Section 11.3.7,** Release Points.

The Low Level Radwaste Storage Building is discussed in **FNP UFSAR Section 11.5.6,** Storage Facilities.

Solidification/Dewatering Facility is discussed in **FNP UFSAR Section 11.5.1,** Design Objectives, and **FNP UFSAR Section 11.5.3.1,** Processing System Design.

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Components Subject to an AMR

Table 2.4.2.7 Yard Structures Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Bolting	NSR Structural Support
Concrete: Foundation	NSR Structural Support Shelter/Protection
Equipment Frames and Housings	NSR Structural Support Shelter/Protection
Fire Door	Fire Barrier NSR Structural Support Shelter/Protection
Masonry Wall	Fire Barrier NSR Structural Support Shelter/Protection
Steel Components: All Structural Steel	NSR Structural Support Shelter/Protection

2.4.3 COMPONENT SUPPORTS

This group includes specific types of component support elements located within in-scope structures.

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 supports within a structure that are included in the scope of license renewal for FNP are identified under the individual structure's description. 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 locations.

Component support elements are discussed in the following sections:

- Supports for ASME and Non-ASME Piping and Components **Section 2.4.3.1**
- Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, Instrument Tubing **Section 2.4.3.2**
- Anchorage of Racks, Panels, Cabinets, and Enclosures for Electrical Equipment and Instrumentation **Section 2.4.3.3**
- Supports for Emergency Diesel Generator, HVAC System Components, and Other Miscellaneous Equipment **Section 2.4.3.4**
- Supports for Platforms, Pipe Whip Restraints, Jet Impingement Shields, and Other Miscellaneous Structures **Section 2.4.3.5**

2.4.3.1 Supports for ASME and Non-ASME Piping and Components

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 vessel is supported on six special pads and shoes that transfer the vessel weight from the inlet and outlet nozzles to structural steel supports embedded in the reactor cavity concrete.

The lower supports for each steam generator consist of four vertical columns and lateral support girders. The upper support consists of a ring girder supported by struts.

Each reactor coolant pump support consists of three structural steel columns and lateral tie bars. The pressurizer is supported by a base skirt with a flange bolted to the concrete slab.

2.4.3.2 Supports for Cable Trays, Conduit, HVAC Ducts, Tube Track, and Instrument Tubing

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.

2.4.3.3 Anchorage of 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.

2.4.3.4 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.

2.4.3.5 Supports for Platforms, Pipe Whip Restraints, Jet Impingement Shields, and Other Miscellaneous Structures

This group includes the structure and anchorage for miscellaneous structures as described above that indirectly support operation. For example, a pipe whip restraint does not support a pipe, so it would not be required for a system to function. However, the whip restraint may be required for safety reasons and would therefore be required for operation of the system. Components evaluated in this group include support structural members, welds, bolting, etc., that comprise the evaluated structure and its anchorage.

FNP UFSAR References

Reactor Vessel Supports, Pressurizer Supports, Steam Generator Supports and Reactor Coolant System Supports are discussed in:

- **FNP UFSAR Section 3.8.3.1,** Description of the Internal Structures;
- **FNP UFSAR Section 5.5.10.2.2,** Pressurizer;
- **FNP UFSAR Section 5.5.14,** Component Supports,
- **FNP UFSAR Figure 5.5-7,** Reactor Vessel Supports;
- **FNP UFSAR Figure 5.5-8**, Dry Containment Steam Generator Supports;
- **FNP UFSAR Figure 5.5-9,** Reactor Coolant Pump Supports;
- **FNP UFSAR Figure 5.5-10,** Pressurizer Supports.

Pipe Whip Restraints are discussed in:

- **FNP UFSAR Section Appendix 3K Attachment B,** Pipe Whip Restraint Design;
- **FNP UFSAR Section 3.6.5.1,** Pipe Whip Restraints;

Supports are also discussed in:

- **FNP UFSAR Section 3.2.1.3,** Category I Mechanical Components and Systems;
- **FNP UFSAR Section 3.2.1.4,** Category I Electrical Equipment;
- **FNP UFSAR Section 3.2.1.5,** Category I Instrumentation and Control Systems
- **FNP UFSAR Section 3.7.3.14,** Field Location of Supports and Restraints
- **FNP UFSAR Section 3.8.5.6,** Materials, Quality Control, and Special Construction Techniques
- **FNP UFSAR Section 9.4,** Air Conditioning, Heating, Cooling, and Ventilation Systems

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None

Components Subject to an AMR

Table 2.4.3 Component Supports Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Battery Racks	NSR Structural Support Structural Support
RPV Supports	Shelter/Protection Structural Support
ASME & Non-ASME Piping and Component Support Members (includes support members, welds, bolted connections, support anchorage to building structure)	NSR Structural Support Structural Support
Constant and variable load spring hangers, guides, stops; sliding surfaces, vibration isolators (for ASME piping and components)	NSR Structural Support Structural Support
Cable Tray, Conduit, HVAC Ducts, Tube Track - (includes support members, welds, bolted connections, support anchorage to building structure)	NSR Structural Support Structural Support
Racks, Panels, Cabinets, etc. (includes support members, welds, bolted connections, support anchorage to building structure)	NSR Structural Support Structural Support Shelter/Protection

Table 2.4.3 (cont'd) Component Supports Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
EDG, HVAC, Miscellaneous Mechanical Equipment Supports (includes support members, welds, bolted connections, support anchorage to building structure)	NSR Structural Support Structural Support
Platforms, PW Restraints, etc. (includes support members, welds, bolted connections, support anchorage to building structure)	NSR Structural Support Structural Support Pipe Whip Restraint HE/ME Shielding

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2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL AND INSTRUMENTATION AND CONTROLS (I&C) SYSTEMS

2.5.1 PLANT-WIDE ELECTRICAL

System Description

The methodology used to identify the electrical and I&C components which require an aging management review is discussed in **Section 2.1.4.3**. The screening for electrical and I&C components was performed on a generic component type basis for the in-scope electrical and I&C systems listed in **Table 2.2-1f**, as well as the electrical and I&C component types associated with in-scope mechanical systems and civil structures listed in **Tables 2.2-1a** through **2.2-1e**. The methodology employed is consistent with the guidance in NEI 95-10.

Plant-Wide Electrical is the designation used by FNP in the LRA for the sole purpose of grouping all electrical components which require an aging management review into one system grouping. It is not a FNP system and is not found in the FNP UFSAR, and is used strictly for convenience in performing electrical AMRs and presenting the results.

FNP UFSAR References

No specific FNP UFSAR references are associated with this system.

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D-169970 Sh. 3
D-173096 Sh. 1

Components Subject to an AMR

Table 2.5.1 Electrical Component Types Subject to Aging Management Review and their Intended Functions

Component Type	Intended Function
Electrical cables and connectors not subject to 10 CFR 50.49 EQ Requirements	Provide electrical connections
Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance	Provide electrical connections
Electrical connectors not subject to 10 CFR 50.49 EQ requirements exposed to borated water leakage	Provide electrical connections
Inaccessible medium-voltage electrical cables not subject to 10 CFR 50.49 EQ requirements	Provide electrical connections
Fuse Holders	Provide electrical connections
High-Voltage Insulators	Insulate and support electrical conductors
Metal Enclosed Cable Bus	Provide electrical connections
Oil-Static Cable	Pressure boundary and Provide Electrical Connections
Switchyard Bus	Provide Electrical Connections
Transmission Conductors	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. 3, Nuclear Energy Institute, March 2001.

3. NUREG 1800,Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, U.S. Nuclear Regulatory Commission, July 2001.

4. NUREG-1801, "Generic Aging Lessons Learned Report," Volumes 1 and 2, NRC, April 2001.

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SECTION 3 AGING MANAGEMENT REVIEW RESULTS

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3.0 AGING MANAGEMENT REVIEW RESULTS

This section 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 for performing the AMRs is summarized 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

FNP structure and component aging management reviews were performed using a methodology consistent with Section 4.2 of NEI 95-10, Revision 3.

Where beneficial for the AMR process, FNP components were grouped into component type groups or, "component groups" for a given FNP LRA system. 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.

The AMR methodology utilized industry reports to identify a set of applicable aging effects for FNP components and structures.

The components requiring an AMR for each FNP LRA system and 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 specific component. The evaluation accounts for differences between FNP plant specific design, materials of construction, and environment parameters, as compared to the assumptions contained within the industry guidance documents. FNP plant specific operating experience was also considered in the evaluation.

One or more aging management programs (AMPs) were identified for all components having an aging effect requiring management. The attributes of each AMP were evaluated to ensure that the program adequately manages the aging effects. Programs were enhanced or new programs were created when necessary to ensure that the aging effects requiring management will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation.

The FNP AMR results information contains comparisons of the FNP AMR results against NUREG-1801 Volumes 1 and 2. Once the FNP integrated plant assessment was completed on a plant specific basis, comparisons to NUREG-1801 were made. Therefore, these comparisons are not considered to be integral to the FNP AMR process, but are provided solely as a review aid.

3.0.2 DETERMINATION OF CONSISTENCY WITH NUREG-1801

SNC evaluates consistency with NUREG-1801 including any changes provided as NRC-approved Interim Staff Guidance documents. SNC conducted two types of comparisons to determine consistency with NUREG-1801, an Aging Management Program (AMP) comparison, and Aging Management Table comparison. The AMP comparisons are described in Appendix B.1.3. The Aging Management Table comparisons are described below:

Aging Management Table Comparison:

This comparison considers how an FNP line item (component type, material, environment, aging effect requiring management and AMP) compares with a NUREG-1801, Vol. 2, Table item from Sections II thru VIII. These comparisons can even cross "systems" in NUREG-1801 when SNC identified components in one system in NUREG-1801 that match components in another FNP system. Note that this comparison "builds" on the AMP assessment described in Appendix B.1.3, since no line item can be consistent with NUREG-1801 unless the AMP(s) credited have consistent attributes. For the Class of 2003 LRA format, consistency is evaluated at two levels: (a) component, material, and environment combination as compared to a GALL line item; and (b) AMP credited by the applicant as compared to the GALL line item's AMP. Because of differences in terminology between GALL and the FNP LRA, the comparison is based fundamentally upon the intent for managing aging.

A component, material, and environment combination is said to be consistent if the same material, environment, and aging effects apply, even if some minor differences exist in the aging mechanism determinations or the environmental descriptors. The AMP is considered consistent with the NUREG-1801 AMP provided it is determined to be consistent for the specific line item. Where SNC determined that the AMP exceptions apply only to specific components or structure, only those items are identified as being consistent with exceptions. Other line items are deemed to be consistent.

3.0.3 AMR RESULTS TABLE STRUCTURE

The organization of Section 3 parallels Chapter 3, “Aging Management Review Results” of NUREG-1800, Standard Review Plan for the Review of License Renewal Applications, dated April 2001, and the standard application format for the Class of 2003 as described in the letter from Alan Nelson of NEI to P. T. Kuo of the NRC dated January 24, 2003 (Reference ISG-10).

The section is subdivided according to the following system groupings:

3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System

3.2 Aging Management of Engineered Safety Features

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

The AMR Results information in Section 3 is presented in the following two table types and “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 table type will hereafter be referred to as “Table 1.”

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, the Reactor Vessel Table in the Reactor Coolant System subsection is Table 3.1.2-1, and the Reactor Vessel Internals Table in the Reactor Coolant System subsection is Table 3.1.2-2. For the Containment Spray System, within the ESF subsection this Table is 3.2.2-1 and the Containment Isolation System Table is Table 3.2.2-2. This table type will hereafter be referred to as “Table 2.”

Further Evaluation Text

In those cases where NUREG-1801, Volume 1 recommends “further evaluation” of an item by the reviewer, separate text sections are provided as an aid in these evaluations. These text sections provide the SNC positions for FNP on each item and address the issues raised in the “further evaluation recommended” sections of NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants. The 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 1 relates to fatigue of reactor coolant 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 3.1.2.2.1 of NUREG-1800. Correspondingly, **Section 3.1.2.2.1** of the LRA provides a discussion of the FNP position and aging management review results for the item. This correlation continues for all of the further evaluation items in Sections 3.1 through 3.6 of NUREG-1800.

3.0.3.1 Table 1 Description

For those structures and components evaluated in NUREG-1801, Table 1 provides a summary comparison of the FNP aging management activities with the aging management activities specified in NUREG-1801, Volume 1.

Table 1 is essentially the same as Tables 1 through 6 of NUREG-1801, Volume 1, with two major differences:

- The first column contains an item number (replacing the "Type" column) and the final column "Item Number in GALL," has been replaced by a discussion column.
- The discussion column provides clarifying and amplifying information to be used in the evaluation of FNP aging management activities for these items.

The discussion column includes:

- Information regarding the applicability of the NUREG-1801 component group to FNP;
- References to the further evaluation information in the text portions of Section 3 for items in the NUREG-1801, Volume 1 Tables that require "further evaluation;"
- Where applicable, conclusions regarding consistency or exceptions regarding the NUREG-1801 information and comparison to the FNP aging management review results and aging management strategies.

3.0.3.2 Table 1 Navigation

Since the Component, Aging Effect / Mechanism, Aging Management Programs, and Further Evaluation Recommended column information in Table 1 is taken directly from NUREG-1801, Volume 1, no review of these columns is required. The information contained in the "Discussion" column is intended to aid the reviewer in comparing the FNP AMR results to NUREG-1801, Volume 1. The discussion column information may be in the form of descriptive text or references to other locations in the LRA where the summary information is presented.

No effort has been made to incorporate "similar" components or structures into the discussion column information. This approach is not needed since each applicable Table 2 provides a complete summary of the FNP AMR results, whether or not a component is directly or indirectly addressed by NUREG-1801.

3.0.3.3 Table 2 Description

Table 2 provides a complete results summary of the aging management reviews of the FNP structures and components identified in Section 2 as being subject to an aging management review. A Table 2 is provided for each plant system or structure which contains components subject to an AMR. Table 2 consists of the following nine columns:

- Column 1 – Component Type

  This column identifies the component types requiring aging management review from Section 2 of the LRA.

  The NUREG-1801, Volume 2 component item number or "*NUREG-1801 Reference*" is denoted in italics below the component type where the component type is included in NUREG-1801 for the system. SNC utilizes this notation to acknowledge where FNP components are described in NUREG-1801, Volume 2, even when significant differences may exist in material, environment, aging effects, and aging management strategies.

  For example, NUREG-1801, Volume 2 component item V.A1.1 applies to the FNP Containment Spray System Piping, even though the aging effect determination is different (loss of material for FNP vs. cracking for NUREG-1801 Volume 2).

  See **Section 3.0.3.4.1** for additional information on this comparison.

- Column 2 - Intended Function

  This column identifies the applicable intended function(s) for each component type. Definitions and abbreviations of the intended functions are contained in the Intended Functions **Table 2.1.4**.

- Column 3 – Material

  This column identifies the material(s) of construction for each component type.

- Column 4 – Environment

  This column identifies the environment(s) for each component type. Where applicable, environment subcategories have been utilized to clarify the specific environment for the component type. For example, raw water environment subcategories include river water, potable water, and drainage. **Table 3.0.3-1** and **Table 3.0.3-2** identify the internal and external service environments.

- Column 5 - Aging Effects Requiring Management

  This column identifies the aging effects 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 6 - Aging Management Programs

  This column identifies the aging management programs credited for each component type to demonstrate that the aging effects requiring management will be adequately managed such that the intended function of the component type will be maintained for the period of extended operation.

Note: These first 6 columns are the same presentation format as used in previous LRA submittals and constitute a complete summary of the FNP AMR results. Columns 7 through 9 below provide comparison information to relate the FNP item to NUREG-1801 aging management table items and clarifying notes. These columns are provided as a review aid.

- Column 7 - NUREG-1801 Vol. 2 Item

  This column identifies applicable NUREG-1801, Volume 2 Aging Management Table item(s) to illustrate similarity between NUREG-1801 and the FNP AMR results.

  The applicable NUREG-1801, Volume 2 item identified is based on highlighting the best comparison between the FNP aging management strategy for the line item and a NUREG-1801, Volume 2 Aging Management Table item. FNP identifies the best NUREG-1801, Volume 2 item for illustrating similarity in an aging management strategy for the material and environment combination, regardless of component type. Identification of component types in NUREG-1801 associated with the FNP component type is provided as a sub-item in Column 1.

  No entry is made in this column when no comparison that aids in the review of this item is identified. See **Section 3.0.3.4.2** for additional information on this comparison.

- Column 8 - Table 1 Item

  When a NUREG-1801, Volume 2 Aging Management Table item is identified in Column 7, a corresponding Table 1 (LRA Table 3.x.1) summary item number is indicated in this column. The Table 1 summary item number referenced correlates directly with the linkage provided in the “Item Number in GALL” column in Tables 1 through 6 of NUREG-1801, Volume 1.

- Column 9 – Notes

  The notes provided in each Table 2 describe how the information in the table aligns with the information in NUREG-1801. Each Table 2 contains both standard “lettered” notes and plant specific “numbered” notes.

  The standard “lettered” notes (e.g., A, B, C…) provide generic information regarding comparison of the FNP aging management strategy with the NUREG-1801, Volume 2 Aging Management Table line item identified in Column 7. Only in special cases is more than one standard note entered for a component type, material, environment, aging effect requiring management, and aging management program line item.

Notes A thru E indicate some level of consistency with NUREG-1801 which may aid in review of the FNP line item. A NUREG-1801, Volume 2 Aging Management Table item is associated with the FNP line item whenever notes A through E are utilized.

Notes F through J denote differences in material, environment, or aging effect requiring management that preclude a review aid comparison. When notes F through J are utilized, no NUREG-1801, Volume 2 Aging Management Table item is associated with the FNP line item.

The plant-specific numbered notes (e.g., 1, 2, 3…) provide plant-specific information or clarification. These notes may indicate why an aging effect is or is not included, provide details regarding program application, or differences between the FNP item and corresponding NUREG-1801, Volume 2 Aging Management Table items. Numbered, plant-specific notes are shown for each system group at the end of the system group Table 2s.

See **Table 3.0.3** below for the list of standard “lettered” notes used in Column 9.

Table 3.0.3 LRA Table 2 Standard "Lettered" Notes

Note Designator	Standard 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.
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.

3.0.3.4 Table 2 Navigation

Table 2 is a complete listing of the FNP AMR results including the component types, materials, environments, aging effects requiring management and credited aging management programs. The component types are transferred directly from the applicable LRA Section 2 scoping results tables. Table 2 provides a means to navigate from the scoping results contained in Section 2 of the LRA to the evaluation of aging management programs credited to manage aging effects.

Table 2 of the FNP LRA addresses two aspects of comparison with NUREG-1801.

- The component item comparison shown in italics in Column 1 of each Table 2 indicates where the FNP component type is identified in NUREG-1801 without regard to materials and environments. When the FNP component type is not specifically identified in NUREG-1801 Volume 2, no italicized entry is made.

- The aging management strategy comparison selects the NUREG-1801 Volume 2 line item that best matches the FNP aging management strategy for the FNP line item under consideration. When the FNP aging management strategy is not specifically identified in NUREG-1801 Volume 2, no NUREG-1801 Volume 2 line item entry is made.

Overlap between the component item comparison and the aging management strategy comparison occurs in the application of the standard notes (e.g., A, B, C…) because these notes contain information regarding the inclusion of a component in NUREG-1801. For additional information, see **Section 3.0.3.4.3** regarding application of the standard notes.

3.0.3.4.1 Component Item Comparison

The component item comparison is provided to aid the reviewer in identifying the specific NUREG-1801 Volume 2 component applicable to the FNP component type . The purpose of this comparison is to highlight similarities between the set of components for an FNP system and the corresponding NUREG-1801 Volume 2 system set of components. It also aids the reviewer in understanding the standard note selection (see **Section 3.0.3.4.3**). This component item comparison does not address aging management strategy attributes.

A component item association is made whenever some parts of the FNP component type are addressed by the NUREG-1801 Volume 2 component item. This was done to illustrate that the NUREG-1801 identified component types exist at FNP, even though the FNP line item may not be aligned with the specific NUREG-1801 Volume 2 aging management line item containing the NUREG-1801 Volume 2 component item.

Multiple NUREG-1801 Volume 2 component items may be applicable for a particular FNP component type. An example of this occurs for ECCS system bolting. NUREG-1801 Volume 2 addresses bolting by associated component, while FNP addresses bolting as a single commodity for the system. In this case, multiple NUREG-1801 component type items are linked to the FNP ECCS bolting component type item.

The component item comparison is provided as a review aid only. The presence of a component type link does not indicate an exact one-to-one correspondence, only that some portions of the FNP component type item are contained in the associated NUREG-1801 Volume 2 component items.

3.0.3.4.2 Aging Management Strategy Comparison

The aging management line item comparison is performed with the goal of illustrating the best possible match between an FNP LRA Table 2 line item and a NUREG-1801 Volume 2 aging management line item. The primary emphasis is placed on finding a similar aging management strategy for the same material and environment combination. The aging management strategy comparison is provided as a review aid only.

The following example is provided to illustrate this process:

For the following sample FNP line item from the ECCS system (ref. **Table 3.2.2-3**);

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program
Bolting	Pressure Boundary	Alloy Steel	Inside	Loss of Material	External Surfaces Monitoring Program

The following NUREG-1801 Volume 2 line items have similar characteristics as illustrated below:

Item	Structure and/or Component	Material	Environment	Aging Effect / Mechanism	Aging Management Program (AMP)	Further Evaluation
E.2-a E2.1	Closure bolting In high-pressure or high-temper-ature systems	Carbon steel, Low alloy steel	Air, moisture, humidity, and leaking fluid	Loss of material / General corrosion	Chapter XI.M18, “Bolting Integrity”	No

Or;

Item	Structure and/or Component	Material	Environment	Aging Effect / Mechanism	Aging Management Program (AMP)	Further Evaluation
E.1-b E1.1	Carbon steel compon-ents (PWRs and BWRs) External Surfaces	Carbon steel, Low alloy steel	Air, moisture, and humidity < 100 C (212 F)	Loss of material / General corrosion	A plant specific aging manageme nt program is to be evaluated	Yes, plant specific

The FNP component type aligns with the first NUREG-1801 line item shown (E.2-a). However, because FNP does not utilize a Bolting Integrity Program to identify general corrosion on carbon and alloy steel bolting, the aging management strategy contained in this NUREG-1801 Volume 2 line item does not provide a best-fit aging management strategy comparison.

The second NUREG-1801 Volume 2 line item (E.1-b) provides the best correlation with the FNP aging management strategy. FNP utilizes a plant-specific External Surfaces Monitoring Program to identify corrosion on the external surfaces of all carbon and alloy steel component surfaces, regardless of the component type. However, in this case, the FNP component type is not as specifically identified as it was in the first NUREG-1801 item (E.2.-a).

The FNP Table 2 NUREG-1801 comparison methodology would select the second NUREG-1801 item (E.1-b) to best illustrate how the FNP aging management strategy aligns with a NUREG-1801 Volume 2 aging management line item. For determinations regarding component type applicability, the reviewer should refer to column 1 of Table 2 where any applicable NUREG-1801 Volume 2 component item links are provided.

3.0.3.4.3 Standard Note Application

The standard “lettered” notes (e.g., A, B, C…) are applied based upon both the component item comparison and the aging management strategy comparison described in sections **3.0.3.4.1** and **3.0.3.4.2** above.

The available standard notes to be selected from are determined based on the component item comparison results. When a NUREG-1801 Volume 2 component item component item association is made, standard Notes A, B, F, G, H, and I are applicable. When no NUREG-1801 Volume 2 component item association is made, standard Notes C, D, and J are applicable. Standard note E can be applied whether or not the component type is specifically included in NUREG-1801 Volume 2.

Based on the results of the component type comparison, the notes are applied based upon the results of the aging management item comparison.

- When all attributes of the FNP line item are consistent with a NUREG-1801 Volume 2 aging management item, including AMP consistency, Notes A or C are used (depending on the component item comparison result). Note that AMP consistency is based upon the specific component under consideration. An AMP may have exceptions to NUREG-1801 Volume 2 Section XI description, but be consistent for a NUREG-1801 Volume 2 line item that does not relate to the exceptions.

- When all attributes of the FNP line item are consistent with a NUREG-1801 Volume 2 aging management item, but the credited AMP(s) takes some exception to the NUREG-1801 Volume 2 AMP(s), Notes B or D are used (depending on the component item comparison result).

- When material, environment, and aging effect requiring management are consistent, but a different AMP is used, Note E is used (without regard to the component item comparison result).

- For FNP items where a component item comparison association is made, but there are differences in material, environment, or aging effect requiring management; Notes F, G, H, or I are used to describe the inconsistency. No link to a NUREG-1801 aging management item is made when Notes F, G, H, or I are used since no review benefit is gained.

- For FNP items where no component item comparison association is made and there are differences in material, environment, or aging effect requiring management such that no beneficial comparison can be made, Note J is used.

3.0.4 INTERNAL AND EXTERNAL SERVICE ENVIRONMENTS

The internal and external service environments used in the aging management reviews to determine the aging effects requiring management are described in **Table 3.0.4-1**, Internal Service Environments and **Table 3.0.4-2**, External Service Environments.

Table 3.0.4-1 Internal Service Environments

Environment	Description
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.
Treated Water	Treated water is demineralized water that may or may not be treated with oxygen scavengers and pH control agents. Systems using treated water include the secondary side (turbine cycle) steam and power conversion systems.
Steam	Steam supply from the Steam Generators to the license renewal boundary.
Closed Cooling Water	Demineralized water that is treated with corrosion inhibitors, pH control agents, or biocides; as needed. Systems using closed cooling water include the component cooling water system and emergency diesel generator (EDG) jacket cooling water systems.
Raw Water	Raw Water is any water not demineralized or treated with corrosion inhibitors or biocides. Subcategories of Raw Water are defined below: River Water - Untreated water taken from the Chattahoochee River without mechanical filtration or chemical treatment; other than biocidal treatment. River water is expected to contain significant amounts of silt and organic matter lifted from the Chattahoochee River or Service Water Pond. River water is used in the FNP Service Water System. Well Water or Potable Water – Water taken directly from deep wells. This type of raw water is assumed not to contain significant amounts of silt, debris, or organic matter (such as clams, mussels, or algae). Potable water is chlorinated or brominated to ensure drinking suitability. Drainage – Water collected from either specific component drains or from area drains.
Fuel Oil	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.
Lubricating Oil	Organic oils used to reduce friction between moving parts, such as bearings.
Dried Gas	Non-condensable vapor with a very limited percentage of moisture present. Dried gases include compressed air (downstream of air dryers), and bottled gases such as carbon dioxide, hydrogen, nitrogen, oxygen and refrigerants.

Table 3.0.4-1 (cont'd) Internal Service Environments

Environment	Description
Air / Gas	Air / Gas describes plant mechanical systems containing air that is similar in temperature and moisture content to ambient air conditions located throughout the plant. No significant condensation is expected.
Air / Gas (wetted)	Gas environments containing significant amounts of moisture where condensation or water pooling may occur have an environment modifier of "(wetted)." Components associated with an Air / Gas (wetted) environment include items such as cooling units or non-dried air system low points.

Table 3.0.4-2 External Service Environments

Environment	Description
Inside	The environment found within environmentally controlled structures. As a minimum, temperature is controlled to prevent freezing. This environment includes the Containment Building, Auxiliary Building, EDG Building, and Service Water Intake Structure. Within containment, the average bulk temperature is 120 °F, 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. Some areas of the containment (e.g., hot pipe penetrations) may be subject to elevated localized temperatures. Components located in the area of systems containing borated water may be subject to borated water leakage.
Outside	An environment where components are exposed to direct sunlight, precipitation, and freezing conditions. Also termed "weather exposed" by NUREG-1801. The outside environment also conservatively includes 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.
Buried	An environment where components are buried in soil or controlled backfill.
Embedded	An environment where components are embedded in concrete.
Submerged	An environment where components are submerged in a tank, vessel, or other enclosure.
Below Grade	Below grade portions of structures are exposed to back fill and ground water. The groundwater at Farley is not aggressive. The groundwater pH in area surrounding the FNP site ranges between 5.7- 8.3; chloride and sulfate concentrations are below the concentrations required for an aggressive environment (per NUREG-1801 Vol. 2 Section III).

3.0.5 OPERATING EXPERIENCE

FNP considered site-specific as well as industry operating experience in the determination of aging effects requiring management.

Site: FNP 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,
- Maintenance Work Orders, and
- Interviews with Systems Engineers.

No additional aging effects requiring management were identified beyond those identified during the AMR process.

Industry: 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 FNP aging management programs.

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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 and Pressurizer) (**Section 2.3.1.3**)
- Steam Generators (**Section 2.3.1.4**)

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 FNP aging management activities with the aging management activities evaluated in NUREG-1801 for reactor vessel, internals, reactor coolant, 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 3.0.3**.

3.1.1.1 Approved Generic Topical Report Applicability

SNC utilized NRC approved WOG Topicals as an input source to aid in identification of aging effects (and mechanisms) requiring management and appropriate aging management strategies. However, determinations of aging effects requiring management do not rely solely on information presented within approved WOG topical reports. Additionally, the FNP aging management programs credited for the Reactor Vessel, Internals, and Reactor Coolant System are specific to FNP and take input not only from the approved WOG topicals, but also from various other industry and plant specific documentation.

The following NRC approved WOG Generic Topical Reports were reviewed as a source of input information for development of the FNP aging management reviews:

- WCAP 14574-A, *License Renewal Evaluation: Aging Management Evaluation for Pressurizers*, December 2000.
- WCAP 14575-A, *License Renewal Evaluation: Aging Management Evaluation for Class 1 Piping and Associated Pressure Boundary Components*", December 2000.
- WCAP 14577-A Revision 1, *License Renewal Evaluation: Aging Management for Reactor Internals*, October 2000.

Since these approved generic topical reports are not incorporated into this application by reference, the Applicant Action Items for these WCAPs are not explicitly addressed in this application. However, items applicable to FNP were considered in the aging management reviews.

3.1.2 RESULTS

The following tables summarize the results of the aging management reviews for the reactor vessel, internals, reactor coolant system, and steam generator components and component groups :

Table 3.1.2-1, Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Table 3.1.2-2, Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Table 3.1.2-3, Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Table 3.1.2-4, Reactor Coolant Systems, 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**)
- Steam Generators (**Section 3.1.2.1.4**)

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:

- carbon steel
- alloy steel (some internally clad with austenitic stainless steel)
- stainless steel
- NiCrFe alloys

To address potential degradation of the control rod drive mechanism (CRDM) NiCrFe Alloy penetrations due to primary water stress corrosion cracking, FNP will replace the FNP Units 1and 2 RPV Heads prior to entering the period of extended operation. As such, the FNP LRA information presented in **Tables 3.1.1** and **3.1.2-1** reflects the replacement RPV head components and not the original RPV head components.

The replacement RPV heads utilize thermally treated Alloy 690 base metal and Alloy 52 / 152 weld metals base metal for all closure head penetrations. The replacement head CRDM pressure housing components are constructed from forged or wrought austenitic stainless steel housing components.

Environments

The RPV and associated pressure boundary components are exposed to the following environments:

- borated water
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with the RPV and associated pressure boundary components require management:

- loss of material
- cracking
- loss of fracture toughness

Aging Management Programs

The following programs manage the aging effects requiring management for the RPV and associated pressure boundary components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- Inservice Inspection Program (**Appendix B.3.1**)
- Reactor Vessel Surveillance Program (**Appendix B.3.4**)
- NiCrFe Component Assessment Program (**Appendix B.5.8**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

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:

- stainless steel (including cast austenitic stainless steel)
- NiCrFe alloys (Alloy 600 and Alloy X-750)

FNP has committed to replace the FNP Unit 2 NiCrFe alloy control rod guide tube support pins with strain hardened austenitic stainless steel support pins. This replacement will be performed prior to entering the period of extended operation. As such, the information presented above and in **Tables 3.1.1** and **3.1.2-2** reflects this replacement.

Environments

The reactor vessel internals components are exposed to the following environment:

- borated water

Aging Effects Requiring Management

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

- loss of material
- cracking
- loss of fracture toughness
- loss of preload / stress relaxation
- change in material properties

Aging Management Programs

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

- Water Chemistry Control Program (**Appendix B.3.2**)
- Inservice Inspection Program (**Appendix B.3.1**)
- Reactor Vessel Internals Program (**Appendix B.5.1**)
- Flux Detector Thimble Inspection Program (**Appendix B.5.2**)

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:

- carbon steel
- alloy steel (some internally clad with austenitic stainless steel)
- stainless steel (including cast austenitic stainless steel)
- NiCrFe Alloys (weld metal)

Environments

The reactor coolant system and connected lines are exposed to the following environments:

- borated water
- closed cooling water (reactor coolant pump thermal barriers)
- air / gas
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with the reactor coolant system and connected lines require management:

- loss of material
- cracking
- loss of fracture toughness
- loss of preload / stress relaxation

Aging Management Programs

The following programs manage the aging effects requiring management for the reactor coolant system and connected lines:

- Water Chemistry Control Program (**Appendix B.3.2**)
- Inservice Inspection Program (**Appendix B.3.1**)
- NiCrFe Component Assessment Program (**Appendix B.5.8**)
- One-Time Inspection Program (**Appendix B.5.5**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.1.2.1.4 Steam Generators Aging Management Review Results

Materials

The materials of construction for the steam generator components subject to aging management review are:

- carbon steel
- alloy steel (some internally clad with austenitic stainless steel or NiCrFe alloy)
- stainless steel
- NiCrFe alloys

Westinghouse Model 54F replacement steam generators have been installed at FNP Units 1 and 2 in 2000 and 2001 respectively. These replacement steam generators incorporate improved materials of construction including thermally treated Alloy 690 tubing and Alloy 52 / 152 weld metal.

Environments

The steam generator components are exposed to the following environments:

- borated water
- treated water and steam
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with the steam generator components require management:

- loss of material
- cracking
- loss of preload / stress relaxation

Aging Management Programs

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

- Water Chemistry Control Program (**Appendix B.3.2**)
- Inservice Inspection Program (**Appendix B.3.1**)
- NiCrFe Component Assessment Program (**Appendix B.5.8**)
- Steam Generator Program (**Appendix B.3.8**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.1.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Reactor Coolant Systems

NUREG-1801 identifies those component, material, environment, aging effect, and aging management program combinations evaluated in NUREG-1801 that warrant further evaluation in a license renewal application. NUREG-1800 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants) outlines the specific issues requiring further evaluation. For the reactor vessel, internals, reactor coolant, and steam generator systems components and component groups, the applicable further evaluation issues are addressed in the following sections.

3.1.2.2.1 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)(1). The Fatigue Monitoring Program manages the fatigue TLAA for fatigue sensitive Safety Class 1 components having evaluations based on the current operating term. See **Section 4.3** for an evaluation of the cumulative fatigue damage TLAA.

3.1.2.2.2 Loss of Material due to Pitting and Crevice Corrosion

FNP will manage loss of material in the steam generator shells and transition cone due to pitting and crevice corrosion with the Water Chemistry Control Program (**Appendix B.3.2**). The Inservice Inspection Program (**Appendix B.3.1**) will detect crack growth due to cyclic loading.

NRC Information Notice 90-04 is referenced by NUREG-1800 as the basis for this NUREG-1801 Volume 1 item regarding enhanced detection of aging effects in the steam generator shell. NRC Information Notice 90-04 indicates that pits on the surface served as corrosion fatigue crack initiation sites, not that pitting corrosion resulted in sufficient degradation to cause loss of component function. This incident type involves isolated cases limited to Westinghouse Model 44 and 51 steam generators. No subsequent industry experience has further identified pitting corrosion resulting in reportable indications for the shell.

The FNP steam generators were replaced in 2000 / 2001 with Westinghouse Model 54F steam generators. Secondary side water chemistry controls have been rigorously maintained during the period of time since replacement such that pitting and crevice corrosion of the replacement steam generator shells is not expected. Based on the above, no augmented inspections are required.

3.1.2.2.3 Loss of Fracture Toughness due to Neutron Irradiation Embrittlement

1. Neutron irradiation embrittlement is a TLAA as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21 (c)(1). The FNP evaluation of the reactor vessel neutron embrittlement TLAA is evaluated in **Section 4.2**.

   An evaluation of the FNP reactor vessel above core components, including the upper shell forging, primary inlet / outlet nozzles, and associated welds, determined that these components are not limiting. Therefore evaluation of the beltline components is adequate to ensure that adequate fracture toughness is retained during the period of extended operation.

2. The Reactor Vessel Surveillance Program (**Appendix B.3.4**), as supported by associated TLAA evaluations (**Section 4.2**), will manage loss of fracture toughness of FNP reactor vessel beltline components due to irradiation embrittlement by addressing the limiting beltline shells and welds.

   The Reactor Vessel Surveillance Program includes a capsule withdrawal schedule that provides sufficient data to assess the effects of irradiation embrittlement on the beltline components during the period of extended operation.

3. Loss of fracture toughness due to irradiation embrittlement and changes in material properties due to void swelling are aging effects / mechanisms requiring management for the FNP baffle / former bolting. FNP replaced the baffle / former bolting pattern required to ensure structural integrity of the baffle assemblies in 1998 / 1999. Tensile testing and metallurgical examination of the removed strain hardened stainless steel bolts indicated that no significant void swelling had occurred and that adequate fracture toughness was retained. Due to the lower end of life fluence expected for these bolts and the operating history to date, no volumetric inspection of FNP baffle bolting is planned. However, as a part of the Reactor Vessel Internals Program, SNC will continue to actively participate in industry initiatives intended to quantify the nature and extent of these aging effects and will update program requirements to address new data regarding these aging effects.

   Therefore, the FNP program credited to address irradiation embrittlement and void swelling of the FNP baffle / former bolts is the Reactor Vessel Internals Program (**Appendix B.5.1**)

3.1.2.2.4 Crack Initiation and Growth due to Thermal and Mechanical Loading or Stress Corrosion Cracking

The One-Time Inspection Program (**Appendix B.5.5**), Water Chemistry Control Program (**Appendix B.3.2**), and Inservice Inspection Program (**Appendix B.3.1**), will manage this aging effect.

Water chemistry control minimizes the potential for SCC within small bore, < 4 NPS, ASME Class 1 piping components. In addition, the One-Time Inspection Program will provide for examinations to ensure that no cracking due to SCC is occurring within these lines. The One-Time Inspection Program also provides for a specific volumetric examination of small bore, < 4 NPS, ASME Class 1 small bore piping to detect cracking due to thermal cycling.

3.1.2.2.5 Crack Growth due to Cyclic Loading

Underclad cracking of reactor vessel and reactor coolant system clad alloy steel forgings is not a TLAA for FNP. All FNP clad alloy steel forgings are either not SA508 Class 2 or did not use a high heat input process for clad deposition. No underclad cracking has been identified at FNP.

3.1.2.2.6 Changes in Dimension due to Void Swelling

NUREG-1801 includes components not expected to be subject to void swelling at FNP based upon neutron fluence and operating temperatures. The FNP reactor internals components determined to be leading indicators for void swelling are the baffle and former assemblies, including baffle / former bolting.

While no PWR-specific data has been developed to date to conclusively indicate that void swelling is a significant issue for PWR reactor vessel internals, FNP conservatively evaluates changes in material properties due to void swelling as a part of the Reactor Vessel Internals Program.

SNC will continue to be an active participant in industry efforts to quantify the nature and extent of void swelling in the PWR environment. The Reactor Vessel Internals Program will be updated based upon the results of these industry initiatives.

Therefore, the Reactor Vessel Internals Program (**Appendix B.5.1**) is credited to manage changes in material properties due to void swelling.

3.1.2.2.7 Crack Initiation and Growth due to Stress Corrosion Cracking or Primary Water Stress Corrosion Cracking

1. The FNP core support lugs and bottom mounted instrumentation penetrations are fabricated from mill annealed Alloy 600. The Water Chemistry Control Program (**Appendix B.3.2**) will mitigate SCC of these components. Additionally, the NiCrFe Component Assessment Program (**Appendix B.5.8**) will assess all FNP NiCrFe component locations to determine appropriate inspection requirements. If augmented inspection requirements are determined to be required, these inspections will be incorporated into the Inservice Inspection Program (**Appendix B.3.1**)

   The pressurizer spray heads are cast austenitic stainless steel. Consistent with item 2 below, the FNP Water Chemistry Program will mitigate SCC of these components. This program implements the guidance contained in EPRI TR-105714 (See item 2 below). In addition, the One-Time Inspection Program (**Appendix B.5.5**) provides for visual inspection of one pressurizer spray head to ensure no significant degradation is occurring.

2. The Water Chemistry Control Program (**Appendix B.3.2**) will mitigate SCC of CASS components exposed to reactor coolant. This program implements the guidance contained in EPRI TR-105714 and therefore is consistent with NUREG-1801 Volume 2 Item IV.C2.1-e.

3. The FNP Pressurizer instrument penetrations and heater sheaths are fabricated from austenitic stainless steel, not NiCrFe alloys.

3.1.2.2.8 Crack Initiation and Growth due to Stress Corrosion Cracking or Irradiation-Assisted Stress Corrosion Cracking

FNP has replaced the pattern of baffle / former bolting required to ensure structural integrity of the baffle assemblies. Tensile testing and metallurgical examination of the removed strain hardened stainless steel bolts indicated that no significant degradation had occurred. Based on the lower end of life fluence expected for these replacement bolts, the improved stress profiles of the replacement bolting, the lower bolt operating stresses due to upflow conversion, and the excellent operating history to date, no volumetric inspection of FNP baffle bolting is planned.

SNC will continue to actively participate in industry initiatives intended to quantify the nature and extent of these aging effects as a part of the Reactor Vessel Internals Program (**Appendix B.5.1**) and will update the program requirements to address new data regarding this aging effect.

Additionally, the Water Chemistry Control Program (**Appendix B.3.2**) will mitigate SCC of the FNP baffle / former bolting.

The combination of these two programs will manage SCC of the FNP baffle / former bolting.

3.1.2.2.9 Loss of Preload due to Stress Relaxation

FNP has replaced the pattern of baffle / former bolting required to ensure structural integrity of the baffle assemblies. During the replacement project, no indications of significant relaxation were noted. As a part of the Reactor Vessel Internals Program (**Appendix B.5.1**), SNC will continue to actively participate in industry initiatives intended to quantify the nature and extent of these aging effects and will update the program requirements to address new data regarding this aging effect.

Visual inspections conducted as a part of the Inservice Inspection Program (**Appendix B.3.1**) are also credited to detect complete loss of preload.

The combination of these two programs will manage stress relaxation of the FNP baffle / former bolting.

3.1.2.2.10 Loss of Section Thickness due to Erosion

This summary item is not applicable to FNP. The FNP steam generators are a recirculating feedring design employing an elevated feedring and feedwater spargers. Impingement plates are not utilized.

3.1.2.2.11 Crack Initiation and Growth due to PWSCC, ODSCC, or Intergranular Attack or Loss of Material due to Wastage and Pitting Corrosion or Loss of Section Thickness due to Fretting and Wear or Denting due to Corrosion of Carbon Steel Tube Support Plate

Degradation of the FNP replacement steam generator thermally treated Alloy 690 tubes is not considered likely based on the improved materials of construction and design of the Model 54F steam generators, but is conservatively considered in the FNP AMR results. The Water Chemistry Control Program (**Appendix B.3.2**) and Steam Generator Program (**Appendix B.3.8**) will manage steam generator tube degradation.

Steam generator tube sleeves and plugs have not been installed in the FNP replacement steam generators. However, thermally treated Alloy 690 is the current material of choice should any plugs or sleeves be installed.

Loss of material due to pitting and wastage related to phosphate chemistry is not applicable to FNP. FNP has not utilized phosphate chemistry. However, localized corrosion of the thermally treated Alloy 690 steam generator tubes is conservatively considered in the FNP AMR results.

The FNP replacement steam generators employ stainless steel tube support plates and flow distribution baffles. As such, denting of tubes at support plate intersections is unlikely to occur. However, the potential for denting is conservatively considered in the FNP AMR results.

3.1.2.2.12 Loss of Section Thickness due to Flow-accelerated Corrosion

This summary item is not applicable to FNP. This item addresses loss of material in Combustion Engineering steam generator tube support lattice bars. The FNP steam generators are a Westinghouse Model 54F design which does not use lattice bars. Furthermore, the FNP replacement steam generator tube support plates are fabricated from FAC-resistant stainless steel, not carbon steel. Therefore, this degradation mode is not applicable to FNP.

3.1.2.2.13 Ligament Cracking due to Corrosion

The FNP replacement steam generator tube support plates are fabricated from stainless steel, not carbon steel. As such, this degradation mode is not applicable to FNP.

3.1.2.2.14 Loss of Material due to Flow-accelerated Corrosion (PWR)

This item addresses loss of material due to FAC in the steam generator feedwater inlet ring and supports. This mode of degradation has only been detected in Combustion Engineering steam generators. The FNP steam generators are a Westinghouse Model 54F design, therefore this item is not applicable to FNP.

3.1.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the reactor vessel, internals, reactor coolant, and steam generator systems. 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 4.5.2**)

3.1.3 CONCLUSION

The Reactor Vessel, Reactor Internals, Reactor Coolant, and Steam Generator 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, Reactor Internals, Reactor Coolant, and Steam Generator 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	Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	See **Section 3.1.2.2.1** for further discussion and **Section 4.3.1** for the FNP evaluation of the cumulative fatigue damage TLAA.
3.1.1-2	Steam generator shell assembly	Loss of material due to pitting and crevice corrosion	Inservice inspection; water chemistry	Yes, detection of aging effects is to be further evaluated	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.2** for further discussion.
3.1.1-3	BWR Only				This summary item is not applicable to FNP.
3.1.1-4	Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E>1 MeV)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	Yes, TLAA	See Subsection 1 of **Section 3.1.2.2.3 (1)** for further discussion and **Section 4.2** for further evaluation of the reactor pressure vessel neutron embrittlement TLAA.
3.1.1-5	Reactor vessel beltline shell and welds	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor vessel surveillance	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.3 (2)** 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
3.1.1-6	Westinghouse and Babcock & Wilcox (B&W) baffle/former bolts	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.3 (3)** for further discussion.
3.1.1-7	Small-bore reactor coolant system and connected systems piping	Crack initiation and growth due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), and thermal and mechanical loading	Inservice inspection; water chemistry; one-time inspection	Yes, parameters monitored/inspected and detection of aging effects are to be further evaluated	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.4** for further discussion.
3.1.1-8	BWR Only				This summary item is not applicable to FNP.
3.1.1-9	BWR Only				This summary item is not applicable to FNP.
3.1.1-10	Vessel shell	Crack growth due to cyclic loading	TLAA	Yes, TLAA	This summary item is not applicable to FNP. See **Section 3.1.2.2.5** for further discussion.
3.1.1-11	Reactor internals	Changes in dimension due to void swelling	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. 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
3.1.1-12	PWR core support pads, instrument tubes (bottom head penetrations), pressurizer spray heads, and nozzles for the steam generator instruments and drains	Crack initiation and growth due to SCC and/or primary water stress corrosion cracking (PWSCC)	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.7 (1)** for further discussion.
3.1.1-13	Cast austenitic stainless steel (CASS) reactor coolant system piping	Crack initiation and growth due to SCC	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.7 (2)** for further discussion.
3.1.1-14	Pressurizer instrumentation penetrations and heater sheaths and sleeves made of Ni-alloys	Crack initiation and growth due to PWSCC	Inservice inspection; water chemistry	Yes, AMP for PWSCC of Inconel 182 weld is to be evaluated	This summary item is not applicable to FNP. The FNP Pressurizer penetrations and heater sheaths are fabricated from stainless steel. See **Section 3.1.2.2.7 (3)** 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
3.1.1-15	Westinghouse and B&W baffle former bolts	Crack initiation and growth due to SCC and irradiation-assisted stress corrosion cracking (IASCC)	Plant specific	Yes, plant specific	See **Section 3.1.2.2.8** for further discussion.
3.1.1-16	Westinghouse and B&W baffle former bolts	Loss of preload due to stress relaxation	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.1.2.2.9** for further discussion.
3.1.1-17	Steam generator feedwater impingement plate and support	Loss of section thickness due to erosion	Plant specific	Yes, plant specific	This summary item is not applicable to FNP. See **Section 3.1.2.2.10** 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
3.1.1-18	(Alloy 600) Steam generator tubes, repair sleeves, and plugs	Crack initiation and growth due to PWSCC, outside diameter stress corrosion cracking (ODSCC), and/or intergranular attack (IGA); or loss of material due to wastage and pitting corrosion, and fretting and wear; or deformation due to corrosion at tube support plate intersections	Steam generator tubing integrity; water chemistry	Yes, effectiveness of a proposed AMP is to be evaluated	The FNP AMR results are consistent with this summary item with the exception that the FNP Model 54F replacement steam generators utilize thermally treated Alloy 690 tubing. See **Section 3.1.2.2.11** for further discussion.
3.1.1-19	Tube support lattice bars made of carbon steel	Loss of section thickness due to flow-accelerated corrosion (FAC)	Plant specific	Yes, plant specific	This summary item is not applicable to FNP. See **Section 3.1.2.2.12** for further discussion.
3.1.1-20	Carbon steel tube support plate	Ligament cracking due to corrosion	Plant specific	Yes, effectiveness of a proposed AMP is to be evaluated	This summary item is not applicable to FNP. 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
3.1.1-21	Steam generator feedwater inlet ring and supports	Loss of material due to flow accelerated corrosion	Combustion engineering (CE) steam generator feedwater ring inspection	Yes, plant specific	This summary item is not applicable to FNP. See **Section 3.1.2.2.14** for further discussion.
3.1.1-22	Reactor vessel closure studs and stud assembly	Crack initiation and growth due to SCC and/or IGSCC	Reactor head closure studs	No	The Inservice Inspection Program (**Appendix B.3.1**) will manage SCC of the reactor vessel closure stud assemblies.
3.1.1-23	CASS pump casing and valve body	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	No	The FNP AMR results are consistent with this summary item. The Inservice Inspection Program (**Appendix B.3.1**) will manage thermal embrittlement of the FNP reactor coolant pump casings. This conclusion is consistent with the May 9, 2000 NRC letter regarding thermal aging embrittlement of cast austenitic stainless steel components. There are no cast austenitic valve bodies in the FNP reactor coolant system.

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	CASS piping	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	No program is needed to manage loss of fracture toughness of the FNP reactor coolant system cast austenitic piping and fittings due to thermal embrittlement. FNP has updated the original leak before break analyses to address the period of extended operation. The results of this calculation update indicate that adequate toughness remains to ensure that an adequate margin exists between the critical crack size and the postulated crack size that yields a detectable leak rate. See **Section 4.5.2**. The FNP cast austenitic piping and fittings include the hot leg, cold leg, and crossover leg piping, the loop elbows, and the 45° accumulator laterals. Chemistry and ferrite values for the reactor coolant system castings were evaluated against the screening criteria contained within the May 9, 2000 NRC letter regarding thermal aging embrittlement of cast austenitic stainless steel components. The results indicate that only the Unit 1 loop elbows are potentially susceptible to loss of fracture toughness due to thermal embrittlement.

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 (cont)					The updated LBB analysis demonstrates that adequate fracture toughness remains during the period of extended operation. The leak before break analysis update utilized conservative end of life toughness values using a methodology consistent with that used by NUREG/CR 4513.
3.1.1-25	BWR piping and fittings; steam generator components	Wall thinning due to flow accelerated corrosion	Flow accelerated corrosion	No	The FNP replacement steam generator feedwater inlet and main steam outlet nozzles are fabricated from alloy steel, not carbon steel. These alloy steel components are much less susceptible to FAC than carbon steel components.

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
3.1.1-26	Reactor coolant pressure boundary (RCPB) valve closure bolting, manway and holding bolting, and closure bolting in high-pressure and high-temperature systems	Loss of material due to wear; loss of preload due to stress relaxation; crack initiation and growth due to cyclic loading and/or SCC	Bolting integrity	No	The Inservice Inspection Program (**Appendix B.3.1**) will manage cracking and stress relaxation of ASME Class 1 bolted connections. Loss of material due to wear was not determined to be an aging effect requiring management. Cracking due to SCC and Loss of Preload due to stress relaxation is conservatively postulated only for ASME Class 1 bolting. There is no CRDM pressure housing flange bolting evaluated for LR. The FNP replacement reactor vessel closure head CRDM penetration housings will employ welded connections.
3.1.1-27	BWR Only				This summary item is not applicable to FNP.
3.1.1-28	BWR Only				This summary item is not applicable to FNP.
3.1.1-29	BWR Only				This summary item is not applicable to FNP.
3.1.1-30	BWR Only				This summary item is not applicable to FNP.
3.1.1-31	BWR Only				This summary item is not applicable to FNP.

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	BWR Only				This summary item is not applicable to FNP.
3.1.1-33	BWR Only				This summary item is not applicable to FNP.
3.1.1-34	BWR Only				This summary item is not applicable to FNP.

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	CRD nozzle	Crack initiation and growth due to PWSCC	Ni-alloy nozzles and penetrations; water chemistry	No	The FNP AMR results are consistent with this summary item. The Water Chemistry Control Program (**Appendix B.3.2**), Inservice Inspection Program (**Appendix B.3.1**), and NiCrFe Component Assessment Program (**Appendix B.5.8**) will manage cracking due to PWSCC of the CRDM penetrations and reactor vessel head vent penetration. The FNP replacement reactor vessel closure head utilizes thermally treated Alloy 690 base metal and Alloy 52 / 152 weld metal in lieu of mill annealed Alloy 600 base metal and Alloy 82 / 182 weld metal. The NiCrFe Component Assessment Program will assess all FNP NiCrFe reactor coolant pressure boundary components to determine the leading locations for PWSCC and any augmented inspection activities. The results of this assessment will be incorporated into the 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
3.1.1-36	Reactor vessel nozzles safe ends and CRD housing; reactor coolant system components (except CASS and bolting)	Crack initiation and growth due to cyclic loading, and/or SCC, and PWSCC	Inservice inspection; water chemistry	No	The FNP AMR Results are consistent with this summary item. Consistent with NUREG-1801, the Water Chemistry Control Program (**Appendix B.3.2**) and Inservice Inspection Program (**Appendix B.3.1**) will manage cracking of these components. The NiCrFe Component Assessment Program (**Appendix B.5.8**) is credited to assess the potential for PWSCC of NiCrFe alloy welds. While the Water Chemistry Control Program and Inservice Inspection Program are credited, Inservice Inspection for this group is primarily directed at welded connections. The Water Chemistry Control Program alone will manage cracking of the non-welded portions of components/component types within this group. The NiCrFe Component Assessment Program will assess the NiCrFe alloy reactor vessel nozzle to safe-end welds, pressurizer nozzle to safe-end welds, and replacement steam generator nozzle to safe end welds for PWSCC. Any augmented inspection requirements will be incorporated into the 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
3.1.1-37	Reactor vessel internals CASS components	Loss of fracture toughness due to thermal aging, neutron irradiation embrittlement, and void swelling	Thermal aging and neutron irradiation embrittlement	No	The FNP AMR results are consistent with the intent of this summary item, with the exception that SNC applies a higher threshold value for neutron fluence effects on stainless steels than does NUREG-1801. However, the resulting conclusion regarding aging management program requirements is similar in that components with higher fluence are considered leading locations for inspection. The Reactor Vessel Internals Program (**Appendix B.5.1**) will manage loss of fracture toughness of these castings. Void swelling of reactor internals components is addressed in **Section 3.1.2.2.6**.
3.1.1-38	External surfaces of carbon steel components in reactor coolant system pressure boundary	Loss of material due to boric acid corrosion	Boric acid corrosion	No	The FNP AMR results are consistent with this summary item. The Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**) will manage loss of material due to boric acid corrosion. The FNP pressurizer relief tank is not in scope.

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
3.1.1-39	Steam generator secondary manways and handholds (carbon steel)	Loss of material due to erosion	Inservice inspection	No	This summary item is not applicable to FNP. The item addresses erosion of once-through steam generator carbon steel manway and handhole covers. FNP has Westinghouse recirculating steam generators and utilizes alloy steel manway and handhole 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
3.1.1-40	Reactor internals, reactor vessel closure studs, and core support pads	Loss of material due to wear	Inservice inspection	No	The FNP AMR results are consistent with this summary item. The Inservice Inspection Program (**Appendix B.3.1**) will manage wear of the reactor vessel flange and the reactor vessel closure stud assemblies. The Inservice Inspection Program (**Appendix B.3.1**) will manage wear of the upper core plate alignment pins, radial keys, and clevis inserts. The FNP Flux Detector Thimble Tube Inspection Program (**Appendix B.5.2**), which is implemented in accordance with the requirements of IEB 88-09, will manage wear of the flux thimbles. NUREG-1801 Volume 2 lists stainless steel as the material of construction for the radial keys and clevis inserts. The FNP radial keys and clevis inserts are fabricated from NiCrFe alloy (Alloy 600).
3.1.1-41	Pressurizer integral support	Crack initiation and growth due to cyclic loading	Inservice inspection	No	The FNP AMR results are consistent with this summary item. The Inservice Inspection Program (**Appendix B.3.1**) will manage crack initiation and growth 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
3.1.1-42	Upper and lower internals assembly (Westing-house)	Loss of preload due to stress relaxation	Inservice inspection; loose part and/or neutron noise monitoring	No	This summary item addresses stress relaxation of the internals holddown spring and clevis insert bolts. The Inservice Inspection Program (**Appendix B.3.1**) will manage loss of preload of these components. Loose part monitoring and neutron noise monitoring are not credited. As a part of the Reactor Vessel Internals Program, SNC will continue to participate in industry initiatives intended to clarify the nature and extent of this aging effect. FNP will incorporate the results of these industry initiatives into the program inspection requirements and acceptance criteria.

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
3.1.1-43	Reactor vessel internals in fuel zone region (except Westinghouse and B&W baffle former bolts	Loss of fracture toughness due to neutron irradiation embrittlement and void swelling	PWR vessel internals; water chemistry	No	The FNP AMR results are generally consistent with this summary item. The Reactor Vessel Internals Program (**Appendix B.5.1**) will manage loss of fracture toughness and changes in material properties due to irradiation embrittlement or void swelling. The Water Chemistry Control Program (**Appendix B.3.2**) is not credited to manage these aging effects, but is applied to all FNP reactor internals components as a corrosion mitigation program. SNC applies a higher fluence threshold for irradiation induced effects on stainless steel components than does the NRC. However, the resulting SNC conclusion is consistent with NUREG-1801 since the components subject to the highest neutron fluence will be evaluated and inspected by the Reactor Vessel Internals 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
3.1.1-44	Steam generator upper and lower heads, tubesheets, and primary nozzles and safe ends	Crack initiation and growth due to SCC, PWSCC, and/or IASCC	Inservice inspection; water chemistry	No	The Water Chemistry Control Program (**Appendix B.3.2**), Inservice Inspection Program, (**Appendix B.3.1**), and NiCrFe Component Assessment Program (**Appendix B.5.8**) will manage cracking due to SCC and PWSCC. The FNP components applicable to this summary line item include only the steam generator primary nozzles, safe-ends, and connecting welds. The NiCrFe Component Assessment Program will assess the potential for PWSCC of the replacement steam generator Alloy 52 / 152 nozzle to safe-end welds. IASCC is not applicable to steam generator components since sufficient neutron fluence to initiate irradiation effects is not present.
3.1.1-45	Vessel internals (except Westinghouse and B&W baffle former bolts)	Crack initiation and growth due to SCC and IASCC	PWR vessel internals; water chemistry	No	The FNP AMR results are consistent with this summary item. The Reactor Vessel Internals program (**Appendix B.5.1**) and the Water Chemistry Control Program (**Appendix B.3.2**) will manage crack initiation and growth in these components.

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	Reactor internals (B&W screws and bolts)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	This summary item is not applicable to FNP. FNP is a Westinghouse plant.
3.1.1-47	Reactor vessel closure studs and stud assembly	Loss of material due to wear	Reactor head closure studs	No	The FNP AMR results conservatively consider loss of material due to wear of the reactor vessel closure studs to be an aging effect requiring management. The Inservice Inspection Program (**Appendix B.3.1**) will manage this aging effect.

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
3.1.1-48	Reactor internals (Westinghouse upper and lower internal assemblies, CE bolts and tie rods)	Loss of preload due to stress relaxation	Inservice inspection; loose part monitoring	No	SNC considers the internals bolted connections most susceptible to stress relaxation to be those joints located in high fluence areas of the vessel since irradiation creep of the component is expected to be the primary source of any relaxation encountered. As such baffle / former bolting is expected to be a leading indicator of stress relaxation. However, stress relaxation of other components is conservatively assumed. The Inservice Inspection Program (**Appendix B.3.1**) and Reactor Vessel Internals Program (**Appendix B.5.1**) will manage loss of preload of these components. Loose part monitoring is not credited. As a part of the Reactor Vessel Internals Program, SNC commits to continued participation in industry initiatives intended to clarify the nature and extent of this aging effect. FNP will incorporate the results of these industry initiatives into the program inspection requirements and acceptance criteria.

Table 3.1.2-1 Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Bottom Head Torus and Dome *IV.A2.5.4*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.5-e	**3.1.1-38**	**A**
Bottom Mounted Instrumentation Guide Tubes	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.A2.2-b	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**J**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Bottom Mounted Instrumentation Penetrations *IV.A2.7.1*	Pressure Boundary	NiCrFe Alloy (Alloy 600)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.A2.7-a	**3.1.1-12**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
Core Exit Thermocouple (CET) and Heated Junction Thermocouple (HJTC) Closure Assemblies	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.A2.2-b	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**J**
CET & HJTC Assembly Bolting	Pressure Boundary	Stainless Steel	Inside	Cracking	**Inservice Inspection Program**	IV.A2.2-e	**3.1.1-26**	**E**
				Loss of Material	**Inservice Inspection Program**	IV.A2.2-f	**3.1.1-26**	**E**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Head Dome and Flange *IV.A2.1.1* *IV.A2.1.2*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**C**, **2**
				Loss of Material	**Water Chemistry Control Program**			**H**, **2**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.1-a	**3.1.1-38**	**A**, **2**
Closure Studs, Nuts, and Washers *IV.A.2.1.3*	Pressure Boundary	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.A2.1-c	**3.1.1-22**	**A**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-o	**3.1.1-38**	**C**
				Loss of Material	**Inservice Inspection Program**	IV.A2.1-d	**3.1.1-47**	**A**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Core Support Lugs *IV.A2.6*	Structural Support	NiCrFe Alloy (Alloy 600)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.A2.6-a	**3.1.1-12**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
CRDM & Instrumentation Housing Penetration Nozzles *IV.A2.2.1* *IV.A.2.7.3*	Pressure Boundary	NiCrFe Alloy (Alloy 690 TT)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.A2.2-a	**3.1.1-35**	**E**, **1**, **2**
				Loss of Material	**Water Chemistry Control Program**			**H**, **1**, **2**
			Inside	None	None Required			**G**, **1**, **2**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
CRDM Housing Flange Adapters *IV.A2.2.1*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.A2.2-b	**3.1.1-36**	**A**, **2**
				Loss of Material	**Water Chemistry Control Program**			**H**, **2**
			Inside	None	None Required			**G**, **2**
CRDM Latch Housings and Rod Travel Housings *IV.A2.2.2*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.A2.2-b	**3.1.1-36**	**A**, **2**
				Loss of Material	**Water Chemistry Control Program**			**H**, **2**
			Inside	None	None Required			**G**, **2**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Head Vent Penetration *IV.A2.7.2*	Pressure Boundary	NiCrFe Alloy (Alloy 690 TT)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.A2.7-b	**3.1.1-35**	**E**, **1**, **2**
				Loss of Material	**Water Chemistry Control Program**			**H**, **1**, **2**
			Inside	None	None Required			**G**, **1**, **2**
Intermediate and Lower Shell Courses *IV.A2.5.2*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**C**
				Loss of Fracture Toughness	**Reactor Vessel Surveillance Program**	IV.A2.5-c	**3.1.1-5**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.5-e	**3.1.1-38**	**C**

Table 3.1.2-1 (cont'd)   Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Leakage Monitoring Tube Assembly *IV.A2.1.4*	Pressure Boundary	NiCrFe Alloy (Alloy 600)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**			**F**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
Primary Inlet and Outlet Nozzles (and nozzle support pads) *IV.A2.3.1,* *IV.A2.3.2*	Pressure Boundary Structural Support	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-g	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.5-e	**3.1.1-38**	**C**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Primary Nozzle Safe Ends *IV.A2.4.1,* *IV.A2.4.2*	Pressure Boundary	Stainless Steel (With NiCrFe Alloy 82/182 Welds and Buttering)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.A2.4-b	**3.1.1-36**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
Refueling Seal Ledge	Pressure Boundary Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.1-d	**3.1.1-38**	**C**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Vessel Flange *IV.A2.5.3*	Pressure Boundary Structural Support	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**C**
				Loss of Material	**Inservice Inspection Program**	IV.A2.5-f	**3.1.1-40**	**A**
					Water Chemistry Control Program			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.5-e	**3.1.1-38**	**A**
Seal Table and Fittings	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.A2.2-b	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**J**

Table 3.1.2-1 (cont'd) Reactor Coolant Systems, Reactor Vessel – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper (nozzle) Shell Course *IV.A2.5.1*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.A2.5-e	**3.1.1-38**	**C**
Ventilation Shroud Support Ring	Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.1-d	**3.1.1-38**	**C**

Table 3.1.2-2 Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Baffle and Former Plates *IV.A2.4.1*	**RVI-1** **RVI-3** **RVI-6**	Stainless Steel	Borated Water	Change in Material Properties	**Reactor Vessel Internals Program**	IV.B2.4-b	**3.1.1-11**	**A**
				Cracking	**Reactor Vessel Internals Program** **Water Chemistry Control Program**	IV.B2.4-a	**3.1.1-45**	**A**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.4-e		**A**
				Loss of Material	**Water Chemistry Control Program**			**H**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Baffle Bolts	**RVI-1** **RVI-3**	Stainless Steel	Borated Water	Change in Material Properties	**Reactor Vessel Internals Program**	IV.B2.4-d	**3.1.1-11**	**B**
IV.B2.4.2				Cracking	**Reactor Vessel Internals Program** **Water Chemistry Control Program**	IV.B2.4-c	**3.1.1-15**	**B**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.4-f	**3.1.1-6**	**A**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program** **Reactor Vessel Internals Program**	IV.B2.4-h	**3.1.1-16**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
BMI Column Cruciforms	**RVI-4**	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.5-k	**3.1.1-45**	**C**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.5-m	**3.1.1-37**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
BMI Columns (with associated fasteners) *IV.B2.6.1*	**RVI-4**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.6-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.5-h	**3.1.1-48**	**D**, **5**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Clevis Inserts and Fasteners *IV.B2.5.6,* *IV.B2.5.7*	**RVI-1**	NiCrFe Alloy (Alloy 600 inserts and Alloy X-750 fasteners)	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.5-e	**3.1.1-45**	**A**
				Loss of Material	**Inservice Inspection Program**	IV.B2.5-o	**3.1.1-40**	**A**
					Water Chemistry Control Program			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.5-i	**3.1.1-42**	**B**, **5**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Control Rod Guide Tube Assemblies (with associated fasteners) *IV.B2.2.1* *IV.B2.2.2*	**RVI-2**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.2-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.5-h	**3.1.1-48**	**D**, **5**
Core Barrel and Core Barrel Flange *IV.B2.3.1* *IV.B2.3.2*	**RVI-1** **RVI-3** **RVI-6**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.3-a	**3.1.1-45**	**A**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.3-c	**3.1.1-43**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Core Barrel Outlet Nozzles *IV.B2.3.3*	**RVI-3**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.3-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
CRGT Support Pins *IV.B2.2.2* *IV.B2.2.3*	**RVI-2**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.2-d	**3.1.1-45**	**A**, **3**
				Loss of Material	**Water Chemistry Control Program**			**H**, **3**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **3**, **5**

* - See end of Table 3.1.2-2 for intended function descriptions

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function*	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Flux Thimble Tubes *IV.B2.6.2*	**RVI-4**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.6-a	**3.1.1-45**	**A**
				Loss of Material	**Flux Detector Thimble Inspection Program**	IV.B2.6-c	**3.1.1-40**	**B**
					Water Chemistry Control Program			**H**
Head / RPV Alignment Pins (with associated fasteners)	**RVI-2**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-a	**3.1.1-45**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Head Cooling Spray Nozzles	**RVI-3**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.3-a	**3.1.1-45**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
HJTC Probe Holder, Probe Holder Extension, and Probe Holder Shroud Assemblies (with associated fasteners)	**RVI-4**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.2-a	**3.1.1-45**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **5**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Internals Holddown Spring *IV.B2.1.7*	**RVI-1**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program** **Inservice Inspection Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-d	**3.1.1-42**	**B**
Lower Core Plate and Fuel Alignment Pins (with associated fasteners) *IV.B2.5.1* *IV.B2.5.2*	**RVI-1** **RVI-3** **RVI-4** **RVI-5**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.5-a	**3.1.1-45**	**A**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.5-c	**3.1.1-43**	**A**, **4**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**			**H**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function*	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Lower Support Columns (with associated fasteners) *IV.B2.5.4*	RVI-1 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking	Water Chemistry Control Program Reactor Vessel Internals Program	IV.B2.5-k	3.1.1-45	A
				Loss of Material	Water Chemistry Control Program			H
				Loss of Preload / Stress Relaxation	Inservice Inspection Program	IV.B2.5-h	3.1.1-48	B, 5
Lower Support Forging *IV.B2.5.3*	RVI-1 RVI-3 RVI-4 RVI-5	Stainless Steel	Borated Water	Cracking	Water Chemistry Control Program Reactor Vessel Internals Program	IV.B2.5-k	3.1.1-45	A
				Loss of Fracture Toughness	Reactor Vessel Internals Program	IV.B2.5-n	3.1.1-43	A, 4
				Loss of Material	Water Chemistry Control Program			H

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function*	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Neutron Panels (with associated fasteners)	RVI-6	Stainless Steel	Borated Water	Cracking	Water Chemistry Control Program Reactor Vessel Internals Program	IV.B2.3-a	3.1.1-45	C
				Loss of Material	Water Chemistry Control Program			H
				Loss of Preload / Stress Relaxation	Inservice Inspection Program	IV.B2.5-h	3.1.1-48	D, 5
Radial Support Keys and Fasteners *IV.B2.5.6*	RVI-1	Stainless Steel	Borated Water	Cracking	Water Chemistry Control Program Reactor Vessel Internals Program	IV.B2.5-a	3.1.1-45	A
				Loss of Material	Inservice Inspection Program	IV.B2.5-o	3.1.1-40	A
					Water Chemistry Control Program			H
				Loss of Preload / Stress Relaxation	Inservice Inspection Program	IV.B2.5-i	3.1.1-42	D, 5

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd)   Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Secondary Core Support Assembly (with associated fasteners)	**RVI-1** **RVI-3** **RVI-4** **RVI-5**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.5-k	**3.1.1-45**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.5-h	**3.1.1-48**	**D**, **5**
Upper Core Plate Alignment Pins (with associated fasteners) *IV.B2.1.5*	**RVI-2**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-i	**3.1.1-45**	**A**
				Loss of Material	**Inservice Inspection Program**	IV.B2.1-l	**3.1.1-40**	**A**
					Water Chemistry Control Program			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **5**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function***	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Upper Core Plate and Fuel Alignment Pins (with associated fasteners) *IV.B2.1.4* *IV.B2.1.6*	**RVI-1** **RVI-3**	Stainless Steel	Borated Water	Cracking	**Reactor Vessel Internals Program** **Water Chemistry Control Program**	IV.B2.1-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **5**
Upper Instrumentation Conduit and Supports (with associated fasteners)	**RVI-4**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.2-a	**3.1.1-45**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **5**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function*	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Support Assembly (with associated fasteners) *IV.B2.1.1*	**RVI-2**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-a	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**D**, **5**
Upper Support Column Bases *IV.B2.1.2*	**RVI-2** **RVI-4**	Cast Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-e	**3.1.1-45**	**A**
				Loss of Fracture Toughness	**Reactor Vessel Internals Program**	IV.B2.1-g	**3.1.1-37**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-2 (cont'd) Reactor Coolant Systems, Reactor Vessel Internals – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function*	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Upper Support Columns (with associated fasteners) *IV.B2.1.2* *IV.B2.1.3*	**RVI-2** **RVI-4**	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program** **Reactor Vessel Internals Program**	IV.B2.1-e	**3.1.1-45**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.B2.1-k	**3.1.1-48**	**B**, **5**

Reactor 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.)

** - See end of Table 3.1.2-2 for intended function descriptions*

Table 3.1.2-3 Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Bolting, Class 1 *IV.C2.4.3*	Pressure Boundary	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.4-e	**3.1.1-26**	**E**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.4-f	**3.1.1-38**	**A**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.C2.4-g	**3.1.1-26**	**E**
		Stainless Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.4-e	**3.1.1-26**	**E**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.C2.4-g	**3.1.1-26**	**E**
Piping, Class 1 (Reactor Coolant Loop) *IV.C2.1.1* *IV.C2.1.2*	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program**	IV.C2.1-c	**3.1.1-36**	**C**
					Water Chemistry Control Program	IV.C2.1-e	**3.1.1-13**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping, Class 1 (Piping Components < NPS 4) *IV.C2.1.5*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **One-Time Inspection Program** **Water Chemistry Control Program**	IV.C2.1-g	**3.1.1-7**	**A**
IV.C2.2.4 *IV.C2.2.5*				Loss of Material	**Water Chemistry Control Program**			**H**
IV.C2.2.6 *IV.C2.2.8*			Inside	None	None Required			**G**
Piping, Class 1 (Piping Components ≥ NPS 4)	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.1-c	**3.1.1-36**	**A**
IV.C2.1.3				Loss of Material	**Water Chemistry Control Program**			**H**
IV.C2.1.4, *IV.C2.2.1,* *IV.C2.2.3*			Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valves Bodies, Class 1	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.1-c	**3.1.1-36**	**C**
IV.C2.4.1 *IV.C2.4.2*				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
Flow Orifice/Element, Class 1	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.1-c	**3.1.1-36**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**J**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
RCP - Pump Casing *IV.C2.3.1*	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.3-b	**3.1.1-36**	**A**
				Loss of Fracture Toughness	**Inservice Inspection Program**	IV.C2.3-c	**3.1.1-23**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
RCP - Main Flange Bolts *IV.C2.3.3*	Pressure Boundary	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.3-e	**3.1.1-26**	**E**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.3-f	**3.1.1-38**	**A**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.C2.3-g	**3.1.1-26**	**E**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
RCP - Main Closure Flange *IV.C2.3.2*	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.3-b	**3.1.1-36**	**C**
				Loss of Fracture Toughness	**Inservice Inspection Program**	IV.C2.3-c	**3.1.1-23**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
RCP - Thermal Barrier Assembly	Pressure Boundary	Stainless Steel	Borated Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**
			Closed Cooling Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**
			Inside (CCW nozzles only)	Cracking	**One-Time Inspection Program**			**J**
Pressurizer - Closure Bolting (Manway) *IV.C2.5.9*	Pressure Boundary	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.5-n	**3.1.1-26**	**E**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-o	**3.1.1-38**	**A**
				Loss of Preload / Stress Relaxation	**Inservice Inspection Program**	IV.C2.5-p	**3.1.1-26**	**E**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pressurizer - Heater Sheaths *IV.C2.5.10*	Pressure Boundary	Austenitic Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-r	**3.1.1-36**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
Pressurizer - Instrument Nozzles and Heater Well Nozzles *IV.C2.5.6*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-g	**3.1.1-36**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) *Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review*

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer - Manway and Cover *IV.C2.5.8*	Pressure Boundary	Alloy Steel / Stainless Steel Insert	Borated Water	Cracking	**Water Chemistry Control Program**	IV.C2.5-m	**3.1.1-36**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-o	**3.1.1-38**	**A**
Pressurizer - Nozzle Safe Ends *IV.C2.5.7*	Pressure Boundary	Stainless Steel (With Alloy 82/182 Welds and Buttering)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**	IV.C2.5-h	**3.1.1-36**	**A**, **6**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer - Nozzles (Surge, Spray, Safety, Relief) *IV.C2.5.2* *IV.C2.5.3*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-g	**3.1.1-36**	**A**, **7**
				Loss of Material	**Water Chemistry Control Program**			**H**, **7**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-b	**3.1.1-1**	**C**, **7**
Pressurizer - Shell, Upper Head, and Lower Head *IV.C2.5.1*	Pressure Boundary	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.C2.5-c	**3.1.1-36**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-b	**3.1.1-38**	**A**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Pressurizer - Spray Head Assembly *IV.C2.5.4*	Flow Direction	Cast Austenitic Stainless Steel	Borated Water	Cracking	**One-Time Inspection Program** **Water Chemistry Control Program**	IV.C2.5-j	**3.1.1-12**	**A**
				Loss of Fracture Toughness	**One-Time Inspection Program,**	IV.C2.5-l	**3.1.1-24**	**E**
				Loss of Material	**One-Time Inspection Program, Water Chemistry Control**			**H**
Pressurizer - Support Lugs *IV.C2.5.12*	Structural Support	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.5-v	**3.1.1-41**	**A**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-u	**3.1.1-38**	**A**
Pressurizer - Support Skirt and Flange *IV.C2.5.11*	Structural Support	Carbon Steel	Inside	Cracking	**Inservice Inspection Program**	IV.C2.5-v	**3.1.1-41**	**C**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.C2.5-u	**3.1.1-38**	**C**

Table 3.1.2-3 (cont'd) *Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pressurizer - Thermal Sleeves (Surge and Spray Nozzles) *IV.C2.5.5*	Pressure Boundary	Stainless Steel (With Alloy 82/182 welds)	Borated Water	Cracking	**Inservice Inspection Program** **NiCrFe Component Assessment Program** **Water Chemistry Control Program**			**H**
				Loss of Material	**Water Chemistry Control Program**			**H**
Closure Bolting (Non Class 1) *IV.C2.4.3*	Pressure Boundary	Stainless Steel	Inside	None	None Required	IV.C2.4-g	**3.1.1-26**	**I**
Piping, (Non Class 1) *IV.C2.2.5* *IV.C2.2.6*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	IV.C2.2-f	**3.1.1-36**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Air / Gas and Inside	None	None Required			**G**

Table 3.1.2-3 (cont'd) Reactor Coolant Systems, Reactor Coolant System and Connected Lines – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valve Bodies, (Non Class 1) *IV.C2.4.1* *IV.C2.4.2*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	IV.C2.2-f	**3.1.1-36**	**D**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Air / Gas and Inside	None	None Required			**G**

Table 3.1.2-4 Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Channel Divider Plate	Flow distribution	NiCrFe Alloy (Alloy 690 TT)	Borated Water	Cracking	**Water Chemistry Control Program**			**J**, **1**
				Loss of Material	**Water Chemistry Control Program**			**J**, **1**
Channel Head and Integral Primary Nozzles *IV.D1.1.8* *IV.D1.1.9*	Pressure Boundary Structural Support	Alloy Steel / Stainless Steel Clad	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**	IV.D1.1-i	**3.1.1-44**	**C**, **1**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.D1.1-g	**3.1.1-38**	**A**
Closure Bolting (Primary) *IV.D1.1.11*	Pressure Boundary	Alloy Steel	Inside	Cracking	**Inservice Inspection Program**	IV.D1.1-l	**3.1.1-26**	**E**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.D1.1-k	**3.1.1-38**	**A**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Bolting (Secondary) *IV.D1.1.7*	Pressure Boundary	Alloy Steel	Inside	None	None Required	IV.D1.1-f	**3.1.1-26**	**I**, **8**
Feedwater Distribution Assembly (Thermal Sleeve, Piping and Fittings, Spargers, Support Structure) *IV.D1.3.1*	Flow distribution	Carbon Steel Alloy Steel NiCrFe Alloy (Alloy 690 TT)	Treated Water	Cracking (alloy steel and NiCrFe alloy)	**Water Chemistry Control Program** **Steam Generator Program**			**F**, **1**
				Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**F**, **1** **I** (carbon steel only)
Feedwater Inlet Nozzle *IV.D1.1.5*	Pressure Boundary	Alloy Steel	Treated Water	Cracking	**Inservice Inspection Program**			**F**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Primary Inlet and Outlet Nozzle Safe Ends *IV.D1.1.9*	Pressure Boundary	Stainless Steel (with NiCrFe Alloy 52 / 152 buttering and welds)	Borated Water	Cracking	**Water Chemistry Control Program** **NiCrFe Component Assessment Program** **Inservice Inspection Program**	IV.D1.1-i	**3.1.1-44**	**A**, **1**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
Primary Manway Covers and Disc Inserts *IV.D1.1.11*	Pressure Boundary	Alloy Steel / Stainless Steel Inserts	Borated Water	Cracking	**Water Chemistry Control Program**			**G**
				Loss of Material	**Water Chemistry Control Program**			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	IV.D1.1-k	**3.1.1-38**	**A**
Primary Moisture Separator and Sludge Collector Assembly	Non-S/R Structural Support	Carbon Steel	Treated Water (and Steam)	Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**J**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Primary Nozzle Dam Rings	Structural Support	NiCrFe Alloy (Alloy 690 TT)	Borated Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**
Secondary Moisture Separator Assembly	Non-S/R Structural Support	Carbon Steel	Treated Water (and Steam)	Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**J**
Secondary Side Manways, Handholes, Inspection Ports, Covers	Pressure Boundary	Alloy Steel	Treated Water (and Steam)	Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**
Stayrod Assemblies	Structural Support	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**J**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Secondary Shell Penetrations *IV.D1.1.10*	Pressure Boundary	Alloy Steel	Treated Water (and Steam)	Cracking	**Inservice Inspection Program**			**J**
				Loss of Material	**Water Chemistry Control Program**	IV.D1.1-c	**3.1.1-2**	**C**
			Inside	None	None Required			**J**
Steam Outlet Flow Limiter	Flow Restriction	NiCrFe Alloy (Alloy 690 TT)	Steam	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**, **1**
Tube Bundle Wrapper and Support Assembly	Structural Support	Carbon Steel	Treated Water	Loss of Material	**Steam Generator Program** **Water Chemistry Control Program**			**J**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Tube Support Plates, Flow Distribution Baffles, and Anti-Vibration Bars *IV.D1.2.4*	Structural Support Flow Distribution	Stainless Steel NiCrFe Alloy (Alloy 690 TT)	Treated Water	Cracking and Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**F**
Tubesheet	Pressure Boundary	Alloy Steel (NiCrFe Alloy Clad on primary side, Alloy 52/152)	Borated Water	Cracking	**Inservice Inspection Program** **Water Chemistry Control Program**			**J**, **1**
				Loss of Material	**Water Chemistry Control Program**			**J**, **1**
			Treated Water	Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**J**, **1**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
U – Tubes Includes Alloy 690 TT welded tube plugs (note that plugs have not been used to date in the replacement steam generators) *IV.D1.2.1* *IV.D1.2.3*	Pressure Boundary Exchange Heat (U-Tubes only)	NiCrFe Alloy (Alloy 690 TT)	Borated Water	Cracking	**Water Chemistry Control Program** **Steam Generator Program**	IV.D1.2-a	**3.1.1-18**	**A**, **1**
				Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**			**H**, **1**
			Treated Water	Cracking	**Water Chemistry Control Program** **Steam Generator Program**	IV.D1.2-b IV.D1.2-c	**3.1.1-18**	**A**, **1**
				Loss of Material	**Water Chemistry Control Program** **Steam Generator Program**	IV.D1.2-e	**3.1.1-18**	**A**, **1**

Table 3.1.2-4 (cont'd) Reactor Coolant Systems, Steam Generators – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Upper Head (with Integral Steam Nozzle)	Pressure Boundary	Alloy Steel / Nickel-based Alloy Clad (Alloy 52/152)	Steam	Cracking	**Inservice Inspection Program**			**H**, **1**
				Loss of Material	**Water Chemistry Control Program**			**H**, **1**
IV.D1.1.1 *IV.D1.1.2*			Inside	None	None Required			**G**
Upper Shells, Lower Shells, and Transition Cones	Pressure Boundary	Alloy Steel	Treated Water (and Steam)	Cracking	**Inservice Inspection Program**	IV.D1.1-c	**3.1.1-2**	**A**, **9**
				Loss of Material	**Water Chemistry Control Program**	IV.D1.1-c	**3.1.1-2**	**A**
IV.D1.1.3 *IV.D1.1.4*			Inside	None	None Required			**G**

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

1. The specific material type is thermally treated Alloy 690 and/or Alloy 52 / 152 weld metal, not mill annealed Alloy 600 and/or Alloy 82 / 182 weld metal.
2. These components are part of the FNP replacement reactor vessel closure head scope of supply.
3. The current FNP Unit 2 NiCrFe Alloy X-750 CRGT support pins will be replaced with austenitic stainless steel pins. The Unit 1 CRGT support pins are austenitic stainless steel.
4. Significant void swelling is not expected in these components.
5. FNP does not credit neutron noise monitoring or loose parts monitoring to manage stress relaxation of reactor internals fasteners.
6. The Nozzle to Safe-End Welds use NiCrFe Alloy 82 / 182.
7. Includes the pressurizer PORV and safety valve relief nozzles normally exposed to a steam environment.
8. Secondary handholes are removed to facilitate sludge removal and visual inspection. Therefore, loss of preload is not an aging effect requiring management.
9. The NUREG-1801 item addresses cracking as the result of corrosion fatigue.

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 2.3.2.3. 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**)
- Containment Isolation System (**Section 2.3.2.2**)
- Emergency Core Cooling System (**Section 2.3.2.3**)

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 FNP 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 3.0.3**.

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, Engineered Safety Features, Containment Spray System – Summary of Aging Management Review

Table 3.2.2-2, Engineered Safety Features, Containment Isolation System – Summary of Aging Management Review

Table 3.2.2-3, Engineered Safety Features, 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**)
- Containment Isolation System (**Section 3.2.2.1.2**)
- Emergency Core Cooling System (**Section 3.2.2.1.3**)

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 components of the Containment Spray System requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel

Environments

Components and commodities of the Containment Spray System are exposed to the following environments:

- borated water
- air/gas
- air/gas (wetted)
- inside (with the potential for borated water leakage)
- embedded

Aging Effects Requiring Management

The following aging effects associated with the Containment Spray System components and commodities require management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Spray System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.2.2.1.2 Containment Isolation System Aging Management Review Results

Materials

The materials of construction for the components of the Containment Isolation System requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel

Environments

Components and commodities of the Containment Isolation System are exposed to the following environments:

- air/gas
- dried gas
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with the Containment Isolation System components and commodities require management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Isolation System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.2.2.1.3 Emergency Core Cooling System Aging Management Review Results

Materials

The materials of construction for the components of the Emergency Core Cooling System (ECCS) requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- copper alloys
- cast iron
- carbon steel, stainless steel clad

Environments

Components and commodities of the ECCS are exposed to the following environments:

- borated water
- closed cooling water
- lube oil
- air/gas
- air/gas (wetted)
- dried gas
- inside (with the potential for borated water leakage)
- embedded
- outside

Aging Effects Requiring Management

The following aging effects associated with the ECCS components and commodities require management:

- loss of material
- cracking

Aging Management Programs

The following programs manage the aging effects requiring management for the ECCS components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.2.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Engineered Safety Features

NUREG-1801 identifies those component, material, environment, aging effect, and aging management program combinations evaluated in NUREG-1801 that warrant further evaluation in a license renewal application. NUREG 1800 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants) outlines the specific issues requiring further evaluation. For the ESF systems, those programs are addressed in the following sections.

3.2.2.2.1 Cumulative Fatigue Damage

For Class 2 and 3 piping components, 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 4.3.3** of this application.

3.2.2.2.2 Loss of Material due to General Corrosion

The FNP scope of components addressed by this summary item discussion includes carbon steel components in the ECCS and Containment Isolation System. The Containment Spray System does not contain any carbon (or low alloy) steel components except for bolting and encapsulation vessels.

The borated water-side of FNP's ECCS components requiring aging management do not include any carbon steel wetted surfaces. The interior surfaces of carbon steel components in the ECCS and Containment Spray System addressed by this summary item are subject to mild environments comprised of air/gas or air/gas (wetted). The FNP One-Time Inspection Program (**Appendix B.5.5**) will manage loss of material due to general corrosion on the carbon steel interior surfaces of the ECCS and CS components requiring aging management subject to an air/gas or air/gas (wetted) environment. FNP has determined that carbon steel components subject to a dry gas environment do not require aging management for general corrosion.

The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material on carbon and alloy steel ESF component exterior surfaces (including bolting) subject to general corrosion.

Components operating at temperatures exceeding 212^{O} F are not considered to be subject to general corrosion since the elevated operating temperature prevents moisture from remaining on the component surface.

3.2.2.2.3 Local Loss of Material due to Pitting and Crevice Corrosion

The FNP scope of components addressed by this summary item discussion includes the interior and exterior surfaces of the carbon steel and stainless steel components in the Containment Isolation System, and the outer surface of the stainless steel refueling water storage tank (RWST).

The FNP Containment Isolation System components do not include treated water, raw water, or liquid waste environments (they are addressed as part of other systems). The applicable interior environments are dry gas and air/gas. FNP has determined that component surfaces exposed to a dry gas environment do not require aging management for local loss of material due to pitting and crevice corrosion. For Containment Isolation System components exposed to an air/gas environment, the FNP One-Time Inspection Program (**Appendix B.5.5**) will be used to manage local loss of material due to pitting and crevice corrosion.

FNP has determined the stainless steel external surfaces exposed to an inside or outside environment do not require aging management for local loss of material due to pitting and crevice corrosion.

FNP has determined that local loss of material due to pitting and crevice corrosion of the underside of the RWST is not an aging effect requiring management as this stainless steel tank is not buried and therefore not subject to significant local loss of material.

3.2.2.2.4 Local Loss of Material due to Microbiologically Influenced Corrosion

The FNP Containment Isolation System components do not include treated water, raw water, or liquid waste environments (they are addressed as part of other systems). The FNP components applicable to this summary item are exposed to a dry gas or an air/gas environment. FNP has determined that local loss of material due to MIC is not a valid aging effect in these environments.

3.2.2.2.5 Changes in Properties due to Elastomer Degradation

BWR Only - This summary item is not applicable to FNP, a Westinghouse PWR.

3.2.2.2.6 Local Loss of Material due to Erosion

The FNP One-Time Inspection Program (**Appendix B.5.5**) will be used to manage local loss of material due to erosion of the charging pump miniflow orifice. At FNP, the high pressure safety injection (HPSI) pumps also serve as the normal charging pumps as part of the chemical and volume control system (CVCS). The operating pump is rotated to equalize run time, consequently the miniflow orifice associated with each pump is potentially susceptible to this aging effect. The one-time inspection will be performed on one of the six high pressure safety injection/charging pump miniflow orifices.

3.2.2.2.7 Buildup of Deposits due to Corrosion

BWR Only - This summary item is not applicable to FNP, a Westinghouse PWR.

3.2.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA’s identified below are associated with the ESF systems components. The LRA section that contains the TLAA review results is indicated in parentheses.

- Metal Fatigue (**Section 4.3.3**)

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	Piping, fittings, and valves in emergency core cooling system	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	The FNP AMR results are consistent with this summary item with regard to fatigue of Class 2 and 3 piping systems. See **Section 3.2.2.2.1** for further discussion.
3.2.1-2	BWR Only				This summary item is not applicable to FNP.
3.2.1-3	Components in containment spray (PWR only), standby gas treatment (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item (for carbon steel materials). See **Section 3.2.2.2.2** for further discussion.
3.2.1-4	BWR Only				This summary item is not applicable to FNP.

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
3.2.1-5	Components in containment spray (PWR only), standby gas treatment system (BWR only), containment isolation, and emergency core cooling systems	Loss of material due to pitting and crevice corrosion	Plant specific	Yes, plant specific	There are no FNP Containment Spray System components associated with this summary item. The FNP component environments are inconsistent with the NUREG-1801 environments for this summary item. See **Section 3.2.2.2.3** for further discussion.
3.2.1-6	Containment isolation valves and associated piping	Loss of material due to microbiologically influenced corrosion (MIC)	Plant specific	Yes, plant specific	Microbiologically influenced corrosion has been determined not to be a valid aging mechanism for the component/material/environment combination represented by this group. See **Section 3.2.2.2.4** for further discussion.
3.2.1-7	BWR Only				This summary item is not applicable to FNP.
3.2.1-8	High-pressure safety injection (charging) pump miniflow orifice	Loss of material due to erosion	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. 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
3.2.1-9	BWR Only				This summary item is not applicable to FNP.
3.2.1-10	External Surfaces of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. The Containment Spray System does not contain any carbon steel components except for bolting. See **Section 3.2.2.2.2** for further discussion.
3.2.1-11	Piping and fittings of CASS in emergency core cooling systems	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	This summary item is not applicable to FNP. There are no cast stainless steel components in ESF Systems subject to temperatures over 482^{O}F.
3.2.1-12	Components serviced by open-cycle cooling system	Loss of material due to general , pitting, and crevice corrosion, MIC, and befouling; buildup of deposit due to biofouling	Open-cycle cooling water system	No	This summary item is not applicable to FNP. There are no ESF components serviced by open-cycle cooling systems.

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	Components serviced by closed-cycle cooling system	Loss of material due to general, pitting, and crevice corrosion	Closed-cycle cooling water system	No	The FNP AMR results are consistent with this summary item as applicable to FNP. The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage loss of material due to general pitting, and crevice corrosion. In addition to these aging mechanisms, stress corrosion cracking is managed for this group at FNP by the FNP Water Chemistry Control Program.
3.2.1-14	BWR Only				This summary item is not applicable to FNP.
3.2.1-15	Pumps, valves, piping and fittings, and tanks in containment spray and emergency core cooling systems	Crack initiation and growth due to SCC	Water chemistry	No	The FNP Containment Spray System operates at temperatures below the threshold for crack initiation due to SCC. The FNP AMR results are consistent with this summary item for portions of the ECCS that operate above the threshold temperature. The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage crack initiation and growth due to SCC.
3.2.1-16	BWR Only				This summary item is not applicable to FNP.

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	Carbon steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	The FNP AMR results are consistent with this summary item. FNP includes carbon and alloy steel bolting in this summary item. The Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**) will manage loss of material due to boric acid corrosion.

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
3.2.1-18	Closure bolting in high-pressure or high-temperature systems	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting Integrity	No	The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material due to general corrosion in carbon and alloy steel bolting. Cracking due to SCC is not an aging effect requiring management for the FNP closure bolting. The bolting material selection in conjunction with sound maintenance practices (control of bolt torquing, proper lubricants and sealing compounds) has been effective in eliminating SCC of bolting at FNP. Industry data and our review of plant-specific operating experience supports this conclusion.

Table 3.2.2-1 Engineered Safety Features, Containment Spray System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *V.A.1.4* *V.A.3.2* *V.A.4.2* *V.A.5.2* *V.E.2*	Pressure Boundary	Carbon Steel And Alloy Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.A.1-b	**3.2.1-17**	**A**, **33**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**, **33**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**, **33**
Eductor *V.A.1.5*	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
			Inside	None	None Required			**G**
Encapsulation Vessel	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**C**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**C**

Table 3.2.2-1 (cont'd) Engineered Safety Features, Containment Spray System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flow Orifice/Element *V.A.1.2*	Pressure Boundary Flow Restriction	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
			Inside and Air / Gas	None	None Required			**G**
Piping *V.A.1.1, V.A.2.1*	Pressure Boundary	Stainless Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**G**
			Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
			Air / Gas , Embedded , And Inside	None	None Required			**G**
Pump Casings *V.A.3.1*	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
			Inside	None	None Required			**G**

Table 3.2.2-1 (cont'd) Engineered Safety Features, Containment Spray System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Spray Nozzles *V.A.2.4*	Flow Distribution	Stainless Steel	Inside	None	None Required			**F**
Valve Bodies *V.A.4.1* *V.A.5.1*	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
			Air / Gas and Inside	None	None Required			**G**
Vortex Breakers	Flow Direction	Stainless Steel	Inside	None	None Required			**J**

Table 3.2.2-2 Engineered Safety Features, Containment Isolation System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Capillary Tubing (sealed)	Pressure Boundary	Stainless Steel	Inside	None	None Required			**J**
Closure Bolting *V.E.2*	Pressure Boundary	Carbon Steel and Alloy Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**A**, **33**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**, **33**
Piping *V.C.1.2*	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**

Table 3.2.2-2 (cont'd) Engineered Safety Features, Containment Isolation System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (cont'd)	Pressure Boundary	Stainless Steel	Air / Gas	None	None Required			**G**
			Inside	None	None Required	V.C.1-b	**3.2.1-5** **3.2.1-6**	**I**
Valve Bodies *V.C.1.1*	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
		Stainless Steel	Air / Gas and Dried Gas	None	None Required			**G**
			Inside	None	None Required	V.C.1-b	**3.2.1-5** **3.2.1-6**	**I**

Table 3.2.2-3 Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
Charging/SI Pump Mini-Flow Orifices *V.D.1.2.3*	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**One-Time Inspection Program**	V.D1.2-c	**3.2.1-8**	**A**
					Water Chemistry Control Program			**H**, **30**
			Inside	None	None Required			**G**
Closure Bolting *V.D1.1.7* *V.D1.2.2* *V.D1.4.2* *V.D1.5.5* *V.D1.8.4* *V.E.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside and Outside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.1-d	**3.2.1-17**	**A**, **33**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**, **33**
		Stainless Steel	Air / Gas, Inside, and Outside	None	None Required			**F**, **33**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
Encapsulation Vessel	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**C**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**C**
Flow Orifice/Element	Flow Restriction Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.1-a	**3.2.1-15**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**
RHR Heat Exchanger (channel head) *V.D1.5.1*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.1-a	**3.2.1-15**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-801 Volume 2 Item	Table 1 Item	Notes
RHR Heat Exchanger (shell) *V.D1.5.3*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	V.D1.5-a	**3.2.1-13**	**B**, **25**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.5-a	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
RHR Heat Exchanger (tube sheet)	Pressure Boundary	Carbon Steel / Stainless Steel Clad (clad on tube side only)	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.1-a	**3.2.1-15**	**C**
				Loss of Material	**Water Chemistry Control Program**			**J**
			Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	V.D1.5-a	**3.2.1-13**	**D**, **25**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-801 Volume 2 Item	Table 1 Item	Notes
RHR Heat Exchanger (tubes) *V.D1.5.2*	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.1-a	**3.2.1-15**	**C**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Closed Cooling Water	Cracking	**Water Chemistry Control Program** **One-Time Inspection Program**			**H**
				Loss of Material	**Water Chemistry Control Program**	V.D1.5-a	**3.2.1-13**	**B**
Oil Cooler (shell) (for High Head Safety Injection Pump)	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.E.1-a	**3.2.1-17**	**C**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**C**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
Oil Cooler (channel head) (for High Head Safety Injection Pump)	Pressure Boundary	Cast Iron	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	V.D1.5-a	**3.2.1-13**	**D**, **25**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.5-b	**3.2.1-17**	**C**
Oil Cooler (tubes) (for High Head Safety Injection Pump)	Exchange Heat Pressure Boundary	Copper Alloy	Closed Cooling Water	Loss of Material	**One-Time Inspection Program** **Water Chemistry Control Program**			**J**
			Lube Oil	None	None Required			**J**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel (HELB isolation piping)	Dried Gas	None	None Required			**G**
V.D1.1.2 *V.D1.1.3* *V.D1.1.4* *V.D1.1.5* *V.D1.1.6*			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.5-a	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
		Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.1-a	**3.2.1-15**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Air / Gas, Dried Gas , Embedded, Inside, and Outside	None	None Required			**G**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
High Head and RHR Pump Casings *V.D1.2.1*	Pressure Boundary	Carbon Steel / Stainless Steel Clad	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.2-b	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
		Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.2-a	**3.2.1-15**	**A**, **32**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Inside	None	None Required			**G**, **30**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-801 Volume 2 Item**	**Table 1 Item**	**Notes**
Safety Injection Accumulators	Pressure Boundary	Carbon Steel / Stainless Steel Clad	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
V.D1.7.1, V.D1.7.2, V.D1.7.3			Air / Gas (vapor space)	None	None Required			**G**, **27**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.7-a	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
Refueling Water Storage Tank	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**
V.D1.8.1, V.D1.8.2, V.D1.8.3			Outside	None	None Required			**G**

Table 3.2.2-3 (cont'd) Engineered Safety Features, Emergency Core Cooling System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-801 Volume 2 Item	Table 1 Item	Notes
Valve Bodies	Pressure Boundary	Carbon Steel	Dried Gas	None	None Required			G
V.D1.4.1		(HELB isolation lines)	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	V.D1.4-c	**3.2.1-17**	**A**
					External Surfaces Monitoring Program	V.E.1-b	**3.2.1-10**	**A**
		Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	V.D1.4-b	**3.2.1-15**	**A**
				Loss of Material	**Water Chemistry Control Program**			**H**
			Air / Gas, Dried Gas, Inside, and Outside	None	None Required			**G**
Vortex Breaker	Flow Direction	Stainless Steel	Inside	None	None Required			**J**

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

25. A one time inspection is provided to verify the adequacy of chemistry control.

27. The air/gas environment for this component is either nitrogen or hydrogen, with no oxygen.

30. Stress corrosion cracking is not possible since operating temperatures are below the threshold temperature of 140°

32. Operating temperatures are outside the parameters listed in the NUREG-1801 Volume 2 line item. However, no changes to the applicable aging effects requiring management or applicable programs result.

33. The FNP process addresses bolting as a commodity regardless of the component type with which the bolting is associated.

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 2.3.3.3 through 2.3.3.24. The following systems are addressed in this system group (with the applicable Section 2 reference in parentheses):

- New Fuel Storage (See **Section 2.4.2.1**, Auxiliary Building)
- Spent Fuel Storage (See **Section 2.4.2.1**, Auxiliary Building)
- Spent Fuel Pool Cooling and Cleanup System (**Section 2.3.3.3**)
- Overhead Heavy and Refueling Load Handling System (**Section 2.3.3.4**)
- Open-Cycle Cooling Water System (**Section 2.3.3.5**)
- Closed-Cycle Cooling Water System (**Section 2.3.3.6**)
- Compressed Air System (**Section 2.3.3.7**)
- Chemical and Volume Control System (**Section 2.3.3.8**)
- Control Room Area Ventilation System (**Section 2.3.3.9**)
- Auxiliary and Radwaste Area Ventilation System (**Section 2.3.3.10**)
- Primary Containment Ventilation System (**Section 2.3.3.11**)
- Yard Structures Ventilation System (**Section 2.3.3.12**)
- Fire Protection (**Section 2.3.3.13**)
- Diesel Fuel Oil System (**Section 2.3.3.14**)
- Emergency Diesel Generator System (**Section 2.3.3.15**)
- Demineralized Water System (**Section 2.3.3.16**)
- High Energy Line Break Detection System (**Section 2.3.3.17**)
- Hydrogen Control System (**Section 2.3.3.18**)
- Liquid Waste and Drains (**Section 2.3.3.19**)
- Oil-Static Cable Pressurization System (**Section 2.3.3.20**)
- Potable and Sanitary Water System (**Section 2.3.3.21**)
- Radiation Monitoring System (**Section 2.3.3.22**)
- Reactor Makeup Water Storage System (**Section 2.3.3.23**)

- Sampling System (**Section 2.3.3.24**)

Table 3.3.1, "Summary of Aging Management Evaluations for Auxiliary Systems in Chapter VII of NUREG-1801," provides a summary comparison of the FNP 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 3.0.3**.

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, (This table intentionally omitted)

Table 3.3.2-2, (This table intentionally omitted)

Table 3.3.2-3, Auxiliary Systems, Spent Fuel Pool Cooling and Cleanup System – Summary of Aging Management Review

Table 3.3.2-4, Auxiliary Systems, Overhead Heavy Load Handling System – Summary of Aging Management Review

Table 3.3.2-5, Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Table 3.3.2-6, Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Table 3.3.2-7, Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Table 3.3.2-8, Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Table 3.3.2-9, Auxiliary Systems, Control Room Area Ventilation System – Summary of Aging Management Review

Table 3.3.2-10, Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Table 3.3.2-11, Auxiliary Systems, Primary Containment HVAC System – Summary of Aging Management Review

Table 3.3.2-12, Auxiliary Systems, Yard Structures HVAC System – Summary of Aging Management Review

Table 3.3.2-13, Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Table 3.3.2-14, Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review

Table 3.3.2-15, Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Table 3.3.2-16, Auxiliary Systems, Demineralized Water System – Summary of Aging Management Review

Table 3.3.2-17, Auxiliary Systems, High Energy Line Break Detection System – Summary of Aging Management Review

Table 3.3.2-18, Auxiliary Systems, Hydrogen Control System – Summary of Aging Management Review

Table 3.3.2-19, Auxiliary Systems, Liquid Waste and Drains – Summary of Aging Management Review

Table 3.3.2-20, Auxiliary Systems, Oil-Static Cable Pressurization System – Summary of Aging Management Review

Table 3.3.2-21, Auxiliary Systems, Potable and Sanitary Water System – Summary of Aging Management Review

Table 3.3.2-22, (This table intentionally omitted)

Table 3.3.2-23, Auxiliary Systems, Reactor Makeup Water Storage System – Summary of Aging Management Review

Table 3.3.2-24, Auxiliary Systems, Sampling 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:

- New Fuel Storage (See **Section 3.5.2.1.2**, Auxiliary Building)
- Spent Fuel Storage (See **Section 3.5.2.1.2**, Auxiliary Building)
- Spent Fuel Pool Cooling and Cleanup System (**Section 3.3.2.1.3**)
- Overhead Heavy and Refueling Load Handling System (**Section 3.3.2.1.4**)
- Open-Cycle Cooling Water System (**Section 3.3.2.1.5**)
- Closed-Cycle Cooling Water System (**Section 3.3.2.1.6**)
- Compressed Air System (**Section 3.3.2.1.7**)
- Chemical and Volume Control System (**Section 3.3.2.1.8**)
- Control Room Area Ventilation System (**Section 3.3.2.1.9**)

- Auxiliary and Radwaste Area Ventilation System (**Section 3.3.2.1.10**)
- Primary Containment Ventilation System (**Section 3.3.2.1.11**)
- Yard Structures Ventilation System (**Section 3.3.2.1.12**)
- Fire Protection (**Section 3.3.2.1.13**)
- Diesel Fuel Oil System (**Section 3.3.2.1.14**)
- Emergency Diesel Generator System (**Section 3.3.2.1.15**)
- Demineralized Water System (**Section 3.3.2.1.16**)
- High Energy Line Break Detection System (**Section 3.3.2.1.17**)
- Hydrogen Control System (**Section 3.3.2.1.18**)
- Liquid Waste and Drains (**Section 3.3.2.1.19**)
- Oil-Static Cable Pressurization System (**Section 3.3.2.1.20**)
- Potable and Sanitary Water System (**Section 3.3.2.1.21**)
- Radiation Monitoring System (**Section 3.3.2.1.22**)
- Reactor Makeup Water Storage System (**Section 3.3.2.1.23**)
- Sampling System (**Section 3.3.2.1.24**)

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

3.3.2.1.1 New Fuel Storage Aging Management Review Results

New fuel storage is evaluated as a structure item as a part of the Auxiliary Building. See **Section 3.5.2.1.2**. However, **Table 3.3.1 Item 3.3.1-11** addresses the FNP position regarding aging management of the new fuel storage components.

3.3.2.1.2 Spent Fuel Storage Aging Management Review Results

Spent fuel storage is evaluated as a structure item as a part of the Auxiliary Building. See **Section 3.5.2.1.2**. However, **Table 3.3.1 Item 3.3.1-13** addresses the FNP position regarding aging management of the spent fuel storage components.

3.3.2.1.3 Spent Fuel Pool Cooling and Cleanup Aging Management Review Results

Materials

The materials of construction for the Spent Fuel Pool Cooling and Cleanup System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel (including cast austenitic stainless steel)

Environments

Components of the Spent Fuel Pool Cooling and Cleanup System are exposed to the following environments:

- borated water
- closed cooling water
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effect associated with Spent Fuel Pool Cooling and Cleanup System components require management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Spent Fuel Pool Cooling and Cleanup System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.4 Overhead Heavy and Refueling Load Handling System Aging Management Review Results

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:

- inside
- outside

Aging Effects Requiring Management

The following aging effect 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:

- Structural Monitoring Program (**Appendix B.4.3**)
- Overhead and Refueling Crane Inspection Program (**Appendix B.3.6**)

3.3.2.1.5 Open-Cycle Cooling Water System Aging Management Review Results

Materials

The materials of construction for the Open-Cycle Cooling Water System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- cast iron
- copper alloys

Environments

Components of the Open-Cycle Cooling Water System are exposed to the following environments:

- air/gas (wetted)
- closed cooling water
- lube oil
- raw water
- inside (with the potential for borated water leakage)
- outside
- buried
- embedded
- submerged

Aging Effects Requiring Management

The following aging effects associated with Open-Cycle Cooling Water System components require management:

- loss of material
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Open-Cycle Cooling Water System components:

- Service Water Program (**Appendix B.4.4**)
- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Buried Piping and Tank Inspection Program (**Appendix B.5.4**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.6 Closed-Cycle Cooling Water System Aging Management Review Results

Materials

The materials of construction for the Closed-Cycle Cooling Water System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel

Environments

Components of the Closed-Cycle Cooling Water System are exposed to the following environments:

- borated water
- closed cooling water
- inside (with the potential for borated leakage)

Aging Effects Requiring Management

The following aging effects associated with Closed-Cycle Cooling Water System components require management:

- cracking
- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Closed-Cycle Cooling Water System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.7 Compressed Air System Aging Management Review Results

Materials

The materials of construction for the Compressed Air System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- galvanized steel
- aluminum
- copper alloy

Environments

Components of the Compressed Air System are exposed to the following environments:

- air / gas (wetted)
- dried gas
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effect associated with Compressed Air System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Compressed Air System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.8 Chemical and Volume Control System Aging Management Review Results

Materials

The materials of construction for the Chemical and Volume Control System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel (including CASS)

Environments

Components of the Chemical and Volume Control System are exposed to the following environments:

- air / gas
- air / gas (wetted)
- borated water
- closed cooling water
- dried gas
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with Chemical and Volume Control System components require management:

- loss of material
- cracking

Aging Management Programs

The following programs manage the aging effects requiring management for the Spent Fuel Pool Cooling and Cleanup System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.9 Control Room Area Ventilation System Aging Management Review Results

Materials

The materials of construction for the Control Room Area Ventilation System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- galvanized steel
- aluminum
- copper alloys
- elastomer

Environments

Components of the Control Room Area Ventilation System components are exposed to the following environments:

- dried gas
- air / gas
- air / gas (wetted)
- inside
- outside
- raw water

Aging Effects Requiring Management

The following aging effects associated with Control Room Area Ventilation System components require management:

- loss of material
- cracking
- changes in material properties
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Control Room Area Ventilation System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)

3.3.2.1.10 Auxiliary and Radwaste Area Ventilation System Aging Management Review Results

Materials

The materials of construction for the Auxiliary and Radwaste Area Ventilation System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- galvanized steel
- copper alloys
- elastomer

Environments

Components of the Auxiliary and Radwaste Area Ventilation System are exposed to the following environments:

- air / gas
- air / gas (wetted)
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with Auxiliary and Radwaste Area Ventilation System components require management:

- loss of material
- cracking
- changes in material properties
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary and Radwaste Area Ventilation System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Service Water Program (**Appendix B.4.4**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.11 Primary Containment Ventilation System Aging Management Review Results

Materials

The materials of construction for the Primary Containment HVAC System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- galvanized steel
- copper alloys
- elastomer

Environments

Components of the Primary Containment HVAC System are exposed to the following environments:

- air / gas
- air / gas (wetted)
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with Primary Containment HVAC System components require management:

- loss of material
- cracking
- changes in material properties
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Primary Containment HVAC System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Service Water Program (**Appendix B.4.4**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.12 Yard Structures Ventilation System Aging Management Review Results

Materials

The materials of construction for the Yard Structures HVAC System components requiring aging management review are:

- carbon steel
- alloy steel
- galvanized steel

Environments

Components of the Yard Structures HVAC System are exposed to the following environments:

- air / gas
- inside
- outside

Aging Effects Requiring Management

The following aging effect associated with Yard Structures HVAC System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Yard Structures HVAC System components:

- External Surfaces Monitoring Program (**Appendix B.5.3**)

3.3.2.1.13 Fire Protection Aging Management Review Results

Materials

The materials of construction for the Fire Protection System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- aluminum
- cast irons
- galvanized steel
- fibers, foams, and ceramics
- lead alloys
- copper alloy

Environments

Components of the Fire Protection System components are exposed to the following environments:

- air / gas (wetted)
- air/gas
- dried gas
- raw water (well water)
- fuel oil
- inside (with the potential for borated water leakage)
- outside
- buried

Aging Effects Requiring Management

The following aging effects associated with Fire Protection System components require management:

- cracking
- loss of material
- fouling
- changes in material properties

A representative sample of the FNP buried cast iron fire protection piping was tested in 2003. The condition of the piping was satisfactory with no indication of an aging effect requiring management for the period of extended operation. Hardness measurements were performed on the pipe exterior surface and the pipe interior surface after removal of coatings, cement lining and surface deposits (dirt and sediment). The results showed no significant difference between the hardness of the outside of the pipe versus the inside of the pipe. Also, the cut surfaces of the samples showed no visual indication of a graphitic corrosion layer on either the exterior or interior surfaces.

Aging Management Programs

The following programs manage the aging effects requiring management for the Fire Protection System components:

- Fire Protection Program (**Appendix B.4.5**)
- Fuel Oil Chemistry Control Program (**Appendix B.4.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Buried Piping and Tank Inspection Program (**Appendix B.5.4**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.14 Diesel Fuel Oil System Aging Management Review Results

Materials

The materials of construction for the Diesel Fuel Oil System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- cast iron
- copper alloys
- nickel alloys

Environments

Components of the Diesel Fuel Oil System components are exposed to the following environments:

- air / gas (includes the vapor spaces of fuel oil tanks)
- fuel oil
- inside (includes areas inside guard pipes and covered trenches)
- outside (includes area inside fuel oil storage tank manway structures)
- buried
- embedded

Aging Effects Requiring Management

The following aging effect associated with Diesel Fuel Oil System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Diesel Fuel Oil System components:

- Fuel Oil Chemistry Control Program (**Appendix B.4.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Buried Piping and Tank Inspection Program (**Appendix B.5.4**)

3.3.2.1.15 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:

- carbon steel (including zinc coated fittings on heat exchangers)
- alloy steel
- stainless steel
- cast iron
- copper alloys

Environments

Components of the Emergency Diesel Generator System components are exposed to the following environments:

- air / gas
- air / gas (wetted)
- closed cooling water
- dried gas
- lube oil
- raw water
- inside
- outside

Aging Effects Requiring Management

The following aging effects associated with Emergency Diesel Generator System components require management:

- cracking
- loss of material
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Emergency Diesel Generator System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- Service Water Program (**Appendix B.4.4**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)

3.3.2.1.16 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
- alloy steel
- stainless steel

Environments

Components of the Demineralized Water System are exposed to the following environments:

- treated water
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effect associated with Demineralized Water System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Demineralized Water System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.17 High Energy Line Break Detection System Aging Management Review Results

Materials

The material of construction for the High Energy Line Break Isolation System components requiring aging management review are:

- stainless steel

Environments

Components of the High Energy Line Break Isolation System are exposed to the following environments:

- air / gas
- inside

Aging Effects Requiring Management

There are no aging effects requiring management for the High Energy Line Break Isolation System components.

Aging Management Programs

No aging management programs are required.

3.3.2.1.18 Hydrogen Control System Aging Management Review Results

Materials

The materials of construction for the Hydrogen Control System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel

Environments

Components of the Hydrogen Control System are exposed to the following environments:

- air / gas
- dried gas
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effect associated with Hydrogen Control System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Hydrogen Control System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.19 Liquid Waste and Drains Aging Management Review Results

Materials

The materials of construction for the Liquid Waste and Drains components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- galvanized steel
- elastomer

Environments

Components of the Liquid Waste and Drains are exposed to the following environments:

- air / gas
- air / gas (wetted)
- borated water
- lube oil (potentially contaminated with water)
- raw water
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with Liquid Waste and Drains components require management:

- cracking
- loss of Material
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Liquid Waste and Drains System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.20 Oil-Static Cable Pressurization System Aging Management Review Results

Materials

The materials of construction for the Oil-Static Cable Pressurization System components requiring aging management review are:

- alloy steel
- carbon steel
- stainless steel
- copper alloys
- elastomer

Environments

Components and of the Oil-Static Cable Pressurization System are exposed to the following environments:

- dried gas
- lube oil
- inside
- outside
- buried

Aging Effects Requiring Management

The following aging effect associated with Oil-Static Cable Pressurization System components requires management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Oil-Static Cable Pressurization System components:

- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Buried Piping and Tank Inspection Program (**Appendix B.5.4**)

3.3.2.1.21 Potable and Sanitary Water System Aging Management Review Results

Materials

The materials of construction for the Potable and Sanitary Water System components requiring aging management review are:

- carbon steel
- alloy steel
- stainless steel
- copper alloy

Environments

Components of the Potable and Sanitary Water System are exposed to the following environments:

- treated water (unmonitored demineralized water)
- raw water (potable)
- inside

Aging Effects Requiring Management

The following aging effect associated with Potable and Sanitary Water System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Potable and Sanitary Water System components:

- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)

3.3.2.1.22 Radiation Monitoring System Aging Management Review Results

As indicated in section 2.3.3.22, The Radiation Monitoring System mechanical components requiring aging management review are included as part of the LRA systems for the process and effluents being monitored.

3.3.2.1.23 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
- alloy steel
- stainless steel

Environments

Components and of the Reactor Makeup Water Storage System are exposed to the following environments:

- treated water
- inside (with the potential for borated water leakage)
- outside

Aging Effects Requiring Management

The following aging effect associated with Reactor Makeup Water Storage System components requires management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Reactor Makeup Water System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.1.24 Sampling System Aging Management Review Results

Materials

The materials of construction for the Sampling System components requiring aging management review are:

- carbon steel
- stainless steel

Environments

Components of the Sampling System are exposed to the following environments:

- borated water
- closed cooling water
- treated water
- inside (with the potential for borated water leakage)

Aging Effects Requiring Management

The following aging effects associated with the Sampling System components require management:

- cracking
- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Sampling System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.3.2.2 Further Evaluation Of Aging Management As Recommended By NUREG-1801 for Auxiliary Systems

NUREG-1801 identifies those component, material, environment, aging effect, and aging management program combinations evaluated in NUREG-1801 that warrant further evaluation in a license renewal application. NUREG 1800 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants) outlines the specific issues requiring further evaluation. For the Auxiliary Systems, those programs are addressed in the following sections.

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

This summary item is not applicable to FNP. The FNP Spent Fuel Pool Cooling and Cleanup System components requiring aging management do not include any elastomer-lined carbon steel components. Other components in NUREG-1801 Volume 2 applicable to this line item are for a BWR. FNP is a Westinghouse PWR.

3.3.2.2.2 Hardening and Cracking or Loss of Strength due to Elastomer Degradation or Loss of Material due to Wear

The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage cracking of elastomers. The program provides for visual inspection of external surfaces where cracking is expected to initiate for the components applicable to this summary item.

The FNP Spent Fuel Pool Cooling and Cleanup Systems do not utilize elastomer lined components.

Loss of material due to wear is not considered to be applicable for the FNP components applicable to this summary item since no cause of wear could be identified. A review of FNP plant specific operating experience did not identify any wear of elastomer components included in this summary item.

3.3.2.2.3 Cumulative Fatigue Damage

For Class 2 and 3 piping components, fatigue is a 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 in **Section 4.3.3**.

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.

3.3.2.2.4 Crack Initiation and Growth due to Cracking or Stress Corrosion Cracking

The FNP high head pumps are centrifugal pumps normally used for chemical and volume control, and are shared with the emergency core cooling system. These high head pump casings are carbon steel with internal surfaces clad with austenitic stainless steel. The FNP AMR results for this casing indicate that the aging effect requiring management for the borated water environment is loss of material due to localized corrosion. The normal operating temperature of these pumps is below the 140^{O} F threshold for stress corrosion cracking. The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage loss of material in these pump casings.

FNP addresses bolting as a commodity, not by component type. See discussion related to **Table 3.3.1, Item 3.3.1-24** for a discussion of the FNP AMR results regarding cracking of bolting.

3.3.2.2.5 Loss of Material due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion

The FNP One-Time Inspection Program (**Appendix B.5.5**) will specifically address loss of material due to corrosion of carbon and low alloy steel, including galvanized steel, in ventilation system components (air handling / cooling units), EDG intake components, and in EDG starting air components where the potential exists for significant condensation or pooling of water within the system. EDG exhaust components are managed by the External Surfaces Monitoring Program (**Appendix B.5.3**).

Additionally, a sample set of carbon steel components exposed to an air / gas environment will be performed as a part of the One-Time Inspection Program to confirm that no significant corrosion is occurring within these components.

The External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material due to corrosion of the external surfaces of carbon steel components.

3.3.2.2.6 Loss of Material due to General, Galvanic, Pitting, and Crevice Corrosion

The FNP AMR results are consistent with this summary item. The FNP One-Time Inspection Program (**Appendix B.5.5**) will manage loss of material due to corrosion on the internal surfaces of the reactor coolant pump oil collection components. The one time inspection will focus on low points where water could accumulate.

3.3.2.2.7 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion and Biofouling

The FNP AMR results are consistent with this summary item with exceptions. The FNP Fuel Oil Chemistry Control Program (**Appendix B.4.2**) and One-Time Inspection Program (**Appendix B.5.5**) will manage loss of material in the fuel oil storage and day tanks.

The FNP Fuel Oil Chemistry Control Program utilizes different ASTM specifications to evaluate fuel oil quality. See the Fuel Oil Chemistry Control Program description for further information.

The FNP fuel oil day tanks are considered to be a part of the Diesel Fuel Oil System, not the Emergency Diesel Generator System.

3.3.2.2.8 Quality Assurance for Aging Management of Nonsafety-Related Components

See **Appendix B.1.4.**

3.3.2.2.9 Crack Initiation and Growth due to Stress Corrosion Cracking and Cyclic Loading

The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage SCC of the CVCS regenerative and letdown heat exchangers. Industry and plant-specific operating experience have not indicated any degradation of these components due to SCC when chemistry controls are maintained in accordance with EPRI guidance. Furthermore, the One-Time Inspection performed on ASME Class 1 small bore piping would serve as an indicator of any SCC of stainless steels in the reactor coolant environment.

These heat exchanger components are not expected to be subject to any unexpected cyclic loading. Fatigue of Class 2 and 3 piping and components is a 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 in **Section 4.3.3**.

3.3.2.2.10 Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion

This item is not applicable to FNP. The FNP spent fuel pool employs boraflex panels, not boral or boron steel panels. See **Table 3.3.1, Item 3.3.1-12** for discussion regarding the FNP boraflex panels.

3.3.2.2.11 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

The FNP AMR results are consistent with this summary item. The FNP Buried Piping and Tank Inspection Program (**Appendix B.5.4**) will manage loss of material on the external surfaces of buried carbon steel piping.

FNP buried carbon steel piping applicable to this summary item is coated with a fiber reinforced coal tar enamel coating. A review of FNP operating history indicates that failures of in-scope buried carbon steel piping resulting from external corrosion have been small in size and limited to service water (OCCW system) piping due to coating holiday or in areas where damage to the coating occurred. An evaluation of the FNP soil conditions indicate high resistivity values reflective of soils lightly to moderately corrosive to carbon steel.

FNP does have a cathodic protection system installed, but no credit is taken for aging management.

Based on the above discussion, FNP maintains that application of the fiber reinforced coal tar enamel coating and programmatic inspection of the coating condition will be adequate to manage loss of material due to external corrosion.

3.3.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the auxiliary systems components. The LRA section that contains the TLAA review results is indicated in parentheses.

- Metal Fatigue (**Section 4.3.3**)

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	Components in spent fuel pool cooling and cleanup	Loss of material due to general, pitting, and crevice corrosion	Water chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	This summary item is not applicable to FNP. See **Section 3.3.2.2.1** for further discussion.
3.3.1-2	Linings in spent fuel pool cooling and cleanup system; seals and collars in ventilation systems	Hardening, cracking and loss of strength due to elastomer degradation; loss of material due to wear	Plant specific	Yes, plant specific	The FNP AMR results are partially consistent with this summary item. See **Section 3.3.2.2.2** for further discussion.
3.3.1-3	Components in load handling, chemical and volume control system (PWR), and reactor water cleanup and shutdown cooling systems (older BWR)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	The FNP AMR results are consistent with this summary item with regard to fatigue of Class 2 and 3 piping systems. Load handling components are adequately designed for the period of operation and no TLAA exists. See **Section 3.3.2.2.3** 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
3.3.1-4	Heat exchangers in reactor water cleanup system (BWR); high pressure pumps in chemical and volume control system (PWR)	Crack initiation and growth due to SCC or cracking	Plant specific	Yes, plant specific	The FNP AMR results are not consistent with this summary item. See **Section 3.3.2.2.4** for further discussion.
3.3.1-5	Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.3.2.2.5** 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
3.3.1-6	Components in reactor coolant pump oil collect system of fire protection	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-time inspection	Yes, detection of aging effects is to be further evaluated	The FNP AMR results are consistent with this summary item. See **Section 3.3.2.2.6** for further discussion.
3.3.1-7	Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel oil chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	The FNP AMR results are consistent with exceptions with this summary item. See **Section 3.3.2.2.7** for further discussion.
3.3.1-8	BWR Only				This summary item is not applicable to FNP.
3.3.1-9	Heat exchangers in chemical and volume control system	Crack initiation and growth due to SCC and cyclic loading	Water chemistry and a plant specific verification program	Yes, plant specific	The FNP Water Chemistry Control Program will manage SCC of the CVCS system regenerative and letdown heat exchangers. See **Section 3.3.2.2.9** 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	Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant specific	Yes, plant specific	This summary item is not applicable to FNP. **See Section 3.3.2.2.10** for further discussion.
3.3.1-11	New fuel rack assembly	Loss of material due to general, pitting, and crevice corrosion	Structures monitoring	No	The FNP AMR results are consistent with this summary item. The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage loss of material of the carbon steel portions of the new fuel storage racks. The FNP new fuel storage racks are fabricated from both carbon steel and stainless steel. No aging management is required for the stainless steel portions of the new fuel storage racks.
3.3.1-12	Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity due to Boraflex degradation.	Boraflex monitoring	No	This summary item is not applicable to FNP. The boraflex panels within the FNP spent fuel pool are not within the scope of license renewal. No credit is taken for the neutron absorption properties of these panels. Spent fuel assembly subcriticality is maintained by the geometrically safe configuration of the storage rack, limitations on storage locations and the soluble boron content of the borated water in the spent fuel pool.

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	Spent fuel storage racks and valves in spent fuel pool cooling and cleanup	Crack initiation and growth due to stress corrosion cracking	Water chemistry	No	The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage loss of material due to localized corrosion. The spent fuel storage racks are not considered susceptible to stress corrosion cracking since the temperature of the borated water in the spent fuel pool is normally less than this threshold temperature for SCC. There are no carbon steel valves clad with stainless steel in the scope of license renewal for the Spent Fuel Pool Cooling and Cleanup System.
3.3.1-14	Closure bolting and external surfaces of carbon steel and low-alloy steel components	Loss of material due to boric acid corrosion	Boric acid corrosion	No	The FNP AMR results are consistent with this summary item. The FNP Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**) will manage loss of material due to boric acid corrosion.

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	Components in or serviced by closed-cycle cooling water system	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system	No	The FNP Water Chemistry Program (**Appendix B.3.2**) will manage loss of material due to corrosion within in-scope FNP Closed-Cycle Cooling Water Systems. The FNP Water Chemistry Program takes exception to NUREG-1801, XI.M21 in that performance testing is not credited. Water chemistry controls are considered adequate to mitigate corrosion within closed cooling water systems. However, to confirm that no significant corrosion is occurring, the FNP One-Time Inspection Program (**Appendix B.5.5**) will provide for a one time inspection of carbon steel components in systems containing closed cooling water.
3.3.1-16	Cranes including bridge and trolleys and rail system in load handling system	Loss of material due to general corrosion and wear	Overhead heavy load and light load handling systems	No	The FNP AMR results are consistent with this summary item. The combination of the FNP Structural Monitoring Program (**Appendix B.4.3**) and Overhead and Refueling Crane Inspection Program (**Appendix B.3.6**) will be adequate to manage loss of material in these components. The FNP AMR results indicate that wear of crane rails due to rolling or sliding of wheels is not expected in any measurable amount owing to the infrequent crane use. However, external visual inspections performed by the FNP Structural Monitoring Program and Overhead and Refueling Crane Inspections will be adequate to identify any wear.

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
3.3.1-17	Components in or serviced by open-cycle cooling water systems	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	No	The FNP AMR results are consistent with this summary item. The FNP Service Water Program (**Appendix B.4.4**) will manage loss of material and fouling within the Open-Cycle Cooling Water System.
3.3.1-18	Buried piping and fittings	Loss of material due to general, pitting, and crevice corrosion, and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	The FNP AMR results are consistent with this summary item. The FNP Buried Piping and Tank Inspection Program (**Appendix B.5.4**) will manage loss of material in buried carbon steel piping due to corrosion of the external surfaces. See **Section 3.3.2.2.11** 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	Components in compressed air system	Loss of material due to general and pitting corrosion	Compressed air monitoring	No	The FNP AMR results are consistent with this summary item for those portions of the FNP compressed air system upstream of the air dryers. The FNP One-Time Inspection Program (**Appendix B.5.5**) will provide for an inspection of these components to determine if any significant corrosion is occurring within these components. A one time inspection is justified based upon reviews of FNP operating experience which indicate that no significant corrosion has been identified within the system to date. Additionally, low points in this portion of the system are routinely drained to prevent moisture accumulation. FNP compressed air system components located downstream of the system dryers are not considered to be subject to a moist or saturated air environment. Operational data indicates that system dew points are well below ambient temperatures.

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
3.3.1-20	Components (doors and barrier penetration seals) and concrete structures in fire protection	Loss of material due to wear; hardening and shrinkage due to weathering	Fire protection	No	The FNP AMR results are generally consistent with this summary item. The FNP Fire Protection Program (**Appendix B.4.5**) will manage cracking and hardening of fire penetration seals and general corrosion of fire rated doors such that the component intended function is maintained. Excessive wear for door appurtenances are also inspected, but these attributes are not credited for license renewal. Loss of material due to wear of the door hardware and hinges is not considered an aging effect but rather a consequence of frequent or rough usage. Concrete components will be managed by the Structural Monitoring Program (**Appendix B.4.3**). Also see **Item Number 3.3.1-30.**
3.3.1-21	Components in water-based fire protection	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling	Fire water system	No	The FNP AMR results are consistent with this summary item, with the exception of bio-fouling noted below. The FNP Fire Protection Program (**Appendix B.4.5**) will manage loss of material in the water-based fire protection system components. In addition, a one time inspection of a sample set of components potentially susceptible to selective leaching will be performed by the One-Time Inspection Program (**Appendix B.5.5**). However, the FNP AMRs concluded that bio-fouling of the water based fire protection system lines is not applicable since the water utilized within this system is taken directly from deep wells located on site and not from the Chattahoochee River.

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
3.3.1-22	Components in diesel fire system	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire protection and fuel oil chemistry	No	The FNP AMR results are consistent with this summary item. The FNP Fire Protection Program (**Appendix B.4.5**) and Fuel Oil Chemistry Control Program (**Appendix B.4.2**) will manage loss of material in the fire protection system diesel fuel oil supply piping. However, the NUREG-1801, Volume 2 item VII.G8.1 includes the diesel driven fire pump casing. This pump casing is exposed to raw water (well water), not fuel oil. The FNP fire pumps are a part of the water-based fire protection system and addressed in **Item Number 3.3.1-21.**
3.3.1-23	Tanks in diesel fuel oil system	Loss of material due to general, pitting, and crevice corrosion	Aboveground carbon steel tanks	No	This summary item is not applicable to FNP for any component addressed in NUREG-1801 Volume 2. The NUREG-1801-Volume 2 item applicable to this summary item is for Diesel Fuel Oil System tanks located outside. The FNP Diesel Fuel Oil System does not have tanks located in the outside environment. The fuel oil storage tanks are buried. The fuel oil day tanks are located inside the Emergency Diesel Building. However, the FNP fire protection diesel fuel oil storage tanks, while not specifically included in NUREG-1801 Volume 2, are located aboveground. The FNP External Surfaces Monitoring Program will manage loss of material on the exterior surfaces of these tanks.

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
3.3.1-24	Closure bolting	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and SCC	Bolting integrity	No	The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material due to general corrosion in carbon and alloy steel bolting. Cracking due to SCC is not an aging effect requiring management for the FNP closure bolting. The bolting material selection in conjunction with sound maintenance practices (control of bolt torquing, proper lubricants and sealing compounds) has been effective in eliminating SCC of bolting at FNP. Industry data and our review of plant-specific operating experience supports this conclusion.
3.3.1-25	BWR Only				This summary item is not applicable to FNP.
3.3.1-26	BWR Only				This summary item is not applicable to FNP.
3.3.1-27	BWR Only				This summary item is not applicable to FNP.
3.3.1-28	BWR Only				This summary item is not applicable to FNP.

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	Components (aluminum bronze, brass, cast iron, cast steel) in open-cycle and closed-cycle cooling water systems, and ultimate heat sink	Loss of material due to selective leaching	Selective leaching of materials	No	The FNP One-Time Inspection Program (**Appendix B.5.5**) includes an inspection of a sample set of components located in raw water systems to identify any selective leaching of susceptible component materials. Selective leaching of components exposed to closed-cycle cooling water (EDG cooling water components) will be managed by the FNP Water Chemistry Control Program (**Appendix B.3.2**). This program provides for chemistry controls and corrosion inhibiting additives to mitigate selective leaching, as well as other forms of corrosion. The FNP CCW pumps are fabricated from carbon steel and are therefore not potentially subject to selective leaching.
3.3.1-30	Fire barriers, walls, ceilings and floors in fire protection	Concrete cracking and spalling due to freeze-thaw, aggressive chemical attack, and reaction with aggregates; loss of material due to corrosion of embedded steel	Fire protection and structures monitoring	No	Concrete structures functioning as fire barriers are addressed in Section 3.5 as a part of the building the barrier is associated with. See **Section 3.5** of the LRA for discussion of the aging effects requiring management and associated aging mechanisms for in-scope FNP concrete elements. The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage degradation of concrete structures.

Table 3.3.2-3 Auxiliary Systems, Spent Fuel Pool Cooling and Cleanup System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.A3.1.1* *VII.A3.2.2* *VII.A3.3.2* *VII.A3.4.3* *VII.A3.6.1* *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.A3.1-a	**3.3.1-14**	**A**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**, **33**
Heat Exchanger (channel head) *VII.A3.4.2*	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**F**, **30**
			Inside	None	None Required			**F**

Table 3.3.2-3 (cont'd) Auxiliary Systems, Spent Fuel Pool Cooling and Cleanup System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Heat Exchanger (shell) *VII.A3.4.1*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.A3.4-a	**3.3.1-15**	**B**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.A3.4-b	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
Heat Exchanger (tubes and tubesheet)	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Closed Cooling Water	Loss of Material	**Water Chemistry Control Program**			**J**
Piping	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**

Table 3.3.2-3 (cont'd) Auxiliary Systems, Spent Fuel Pool Cooling and Cleanup System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pump Casings	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**
Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**F**
VII.A3.3.1			Inside	None	None Required			**F**

Table 3.3.2-4 Auxiliary Systems, Overhead Heavy and Refueling Load Handling System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Baseplates and anchors for attachment to structures, and retaining clips	Non-S/R Structural Support Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.B5.1-a	**3.5.1-29**	**C**
Cranes including bridge and trolley: Structural Girders *VII.B.1.1*	Non-S/R Structural Support Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Overhead and Refueling Crane Inspection Program**	VII.B.1-b	**3.3.1-16**	**A**
					Structural Monitoring Program			**E**
Rail System: Rail *VII.B.2.1*	Non-S/R Structural Support Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Overhead and Refueling Crane Inspection Program**	VII.B.2-a	**3.3.1-16**	**A**, **56**

Table 3.3.2-5 Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
				Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
		Stainless Steel	Inside and Outside	None	None Required			**F**, **33**
CCW Heat Exchanger (channel head) *VII.C.1.3.3*	Pressure Boundary	Carbon Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
CCW Heat Exchanger (shell)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**E**
VII.C.1.3.1			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
				Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
CCW Heat Exchanger (tubesheet)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**E**
VII.C.1.3.4			Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**C**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
CCW Heat Exchanger (tubes)	Pressure Boundary Exchange Heat	Copper Alloy (Brass)	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**E**
VII.C.1.3.5			Raw Water (River)	Loss of Material	**Service Water Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**A**
				Fouling	**Service Water Program**	VII.C1.3-b	**3.3.1-17**	**A**
				Loss of Material (selective leaching)	**One Time Inspection Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**A**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Containment and ESF Room Coolers (channel heads and tubes)	Pressure Boundary Exchange Heat (tubes only)	Copper Alloy	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**C**
			Raw Water	Loss of Material (selective leaching)	**One Time Inspection Program**	VII.C1.3-a	**3.3.1-17** **3.3.1-29**	**C**
			Inside	None	None Required			**J**
		Stainless Steel (for replacement coolers)	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
			Inside	None	None Required			**J**
Air compressor lube oil cooler (channel head)	Pressure Boundary	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
			Inside	None	None Required			**J**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air compressor lube oil cooler (shell)	Pressure Boundary	Stainless Steel	Lube Oil and Inside	None	None Required			J
Air compressor lube oil cooler (tubes / tubesheet)	Pressure Boundary Exchange Heat (tubes only)	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	C
			Lube Oil	None	None Required			J
Air compressor intercooler, aftercooler and bleed-off air coolers (shells)	Pressure Boundary	Stainless Steel	Raw Water (River) (intercooler and aftercooler)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	C
			Air / Gas (wetted) (bleed-off cooler)	Loss of Material	**One-Time Inspection Program**			J
			Inside	None	None Required			J

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Air compressor bleed-off air cooler	Pressure Boundary	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
(channel head)			Inside	None	None Required			**J**
Air compressor intercooler, aftercooler and bleed-off air coolers	Pressure Boundary	Stainless Steel	Raw Water (River) (internal for bleed-off cooler)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
(tubes / tubesheet)	Exchange Heat (tubes only)	Stainless Steel	Air / Gas (wetted) (internal for intercooler and aftercooler)	Loss of Material	**One-Time Inspection Program**			**J**
Flow Orifice/Element *VII.C.1.4.1*	Pressure Boundary Flow Restriction	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.4-a	**3.3.1-17**	**A**
			Inside and Outside	None	None Required			**G**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**A**
VII.C.1.1.1 *VII.C.1.1.2*			Air / Gas (wetted)	Loss of Material	**One Time Inspection Program**			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**	VII.C1.1-b	**3.3.1-18**	**A**
			Submerged	Loss of Material	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**A**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping (Cont'd)	Pressure Boundary	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**A**
			Inside and Outside	None	None Required			**G**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**			**F**
			Submerged	Loss of Material	**One-Time Inspection Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**E**
Piping with Guard Pipe	Pressure Boundary	Carbon Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
			Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Embedded	None	None Required			**G**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Service Water Pump Casings *VII.C.1.5.1*	Pressure Boundary	Carbon Steel (Stainless Steel fasteners)	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.5-a	**3.3.1-17** **3.3.1-29**	**A**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Lube and Cooling Water Pump Casings *VII.C.1.5.1*	Pressure Boundary	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.1-a	**3.3.1-17** **3.3.1-29**	**C**
			Inside	None	None Required			**F**
Strainers (element)	Debris Protection	Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.6-a	**3.3.1-17**	**C**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Strainers (shell)	Pressure Boundary	Cast Iron	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.5-a	**3.3.1-17** **3.3.1-29**	**C**, **38**
VII.C.1.6.1				Loss of Material (selective leaching)	**One-Time Inspection Program**	VII.C1.5-a	**3.3.1-17** **3.3.1-29**	**C**, **38**
			Inside	None	None Required			**G**
		Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.6-a	**3.3.1-17**	**A**
			Inside	None	None Required			**G**

Table 3.3.2-5 (cont'd) Auxiliary Systems, Open-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies *VII.C.1.2.1*	Pressure Boundary	Carbon Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.2-a	**3.3.1-17** **3.3.1-29**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
				Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Raw Water (River)	Loss of Material and Fouling	**Service Water Program**	VII.C1.2-a	**3.3.1-17** **3.3.1-29**	**A**
			Inside and Outside	None	None Required			**G**

Table 3.3.2-6 Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**, **33**
		Stainless Steel	Inside	None	None Required			**F**, **33**
Flow Orifice/Element	Flow Restriction Pressure Boundary	Stainless Steel	Closed Cooling Water	Cracking	**Water Chemistry Control Program**			**F**, **29**
				Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.3.2-6 (cont'd) Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Reactor Coolant Drain Tank Heat Exchanger (shell)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.E1.8-c	**3.3.1-15**	**D**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
Reactor Coolant Drain Tank Heat Exchanger (tubes and tubesheet)	Pressure Boundary	Stainless Steel	Borated Water and Closed Cooling Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**J**

Table 3.3.2-6 (cont'd) Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping *VII.C2.1.1*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C2.1-a	**3.3.1-15**	**B**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Closed Cooling Water	Cracking	**Water Chemistry Control Program**			**F**, **29**
				Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.3.2-6 (cont'd) Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pump Casings	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C2.3-a	**3.3.1-15** **3.3.1-29**	**B**
VII.C2.3.1			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
CCW Surge Tanks *VII.C2.4.1*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C2.4-a	**3.3.1-15**	**B**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-6 (cont'd) Auxiliary Systems, Closed-Cycle Cooling Water System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies *VII.C2.2.1*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VII.C2.2-a	**3.3.1-15**	**B**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Closed Cooling Water	Cracking	**Water Chemistry Control Program**	VII.C2.2-a	**3.3.1-15**	**H**, **29**
				Loss of Material	**Water Chemistry Control Program**	VII.C2.2-a	**3.3.1-15**	**B**
			Inside	None	None Required			**G**

Table 3.3.2-7 Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Air Accumulators	Pressure Boundary	Carbon Steel	Dried Gas	None	None Required			G
VII.D.3.1			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
Air Dryer	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.D.6-a	**3.3.1-19**	**E**
VII.D.6.1			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Air Receiver	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.D.3-a	**3.3.1-19**	**E**
VII.D.3.1			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-7 (cont'd) Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.D.1.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
VII.D.2.2 *VII.D.3.2* *VII.D.5.2* *VII.D.6.2* *VII.I.2*					**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**

Table 3.3.2-7 (cont'd) Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Filters (casing)	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.D.5-a	**3.3.1-19**	**E**
VII.D.5.1			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy and Stainless Steel	Dried Gas and Inside	None	None Required			**F**

Table 3.3.2-7 (cont'd) Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping *VII.D.1.1*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.D.1-a	**3.3.1-19**	**E**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy and Stainless Steel	Dried Gas and Inside	None	None Required			**F**
Fluid Traps	Pressure Boundary	Galvanized Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	None	None Required			**J**

Table 3.3.2-7 (cont'd) Auxiliary Systems, Compressed Air System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Aluminum	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**F**
VII.D.2.1			Inside	None	None Required			**F**
		Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.D.2-a	**3.3.1-19**	**E**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas and Inside	None	None Required			**F**
		Stainless Steel	Dried Gas and Inside	None	None Required			**F**

Table 3.3.2-8 Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.E1.1.2* *VII.E1.2.1* *VII.E1.4.1* *VII.E1.7.5* *VII.E1.8.5* *VII.E1.9.1* *VII.E1.10.1* *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.E1.1-b	**3.3.1-14**	**A**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**, **33**
		Stainless Steel	Inside	None	None Required			**F**, **33**
Regenerative Heat Exchanger (channel heads) *VII.E1.7.1*	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Inside	None	None Required			**G**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Regenerative Heat Exchanger (shells) *VII.E1.7.4*	Pressure Boundary	Cast Austenitic Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Inside	None	None Required			**G**
Regenerative Heat Exchanger (tubes / tubesheet) *VII.E1.7.2* *VII.E1.7.3*	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**B**
			Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **39**
Letdown, Excess Letdown, and RCP Seal Water Heat Exchangers (channel head) *VII.E1.8.1*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Inside	None	None Required			**G**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Letdown, Excess Letdown, and RCP Seal Water Heat Exchangers (shell) *VII.E1.8.4*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.E1.8-c	**3.3.1-15**	**B**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
Letdown, Excess Letdown, and RCP Seal Water Heat Exchangers (tubes / tubesheet) *VII.E1.8.2* *VII.E1.8.3*	Pressure Boundary Exchange Heat	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**B**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Closed Cooling Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**E**, **36**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Boron Thermal Regeneration Chiller (channel head)	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Inside	None	None Required			**J**
Boron Thermal Regeneration Chiller (tubes / tubesheet)	Pressure Boundary	Stainless Steel	Borated Water and Closed Cooling Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
Boron Thermal Regeneration Moderating and Reheat Heat Exchanger (channel head and shell)	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Inside	None	None Required			**J**
Boron Thermal Regeneration Moderating and Reheat Heat Exchangers (tubes / tubesheet)	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Demineralizers (Pressure Retaining Components)	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Inside	None	None Required			**J**
Filters (casing)	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Inside	None	None Required			**J**
Letdown Orifices	Pressure Boundary Flow Restriction	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
					One-Time Inspection Program			**I**, **37**
			Inside	None	None Required			**J**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping *VII.E1.1.1*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Air / Gas, Dried Gas, and Inside	None	None Required			**G**
Boric Acid Transfer Pump Casings	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Inside	None	None Required			**J**
Boric Acid Tanks	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Air / Gas (air space) and Inside	None	None Required			**J**

Table 3.3.2-8 (cont'd) Auxiliary Systems, Chemical and Volume Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Volume Control Tank	Pressure Boundary	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**H**, **30**, **39**
			Air / Gas (wetted) (vapor space)	None	None Required			**J**, **27**
			Inside	None	None Required			**J**
Valve Bodies *VII.E1.3.1*	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.7-c	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**H**, **39**
			Air / Gas, Dried Gas, and Inside	None	None Required			**G**

Table 3.3.2-9 Auxiliary Systems, Control Room Area Ventilation System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
VII.F1.1.1 *VII.I.2*		Copper Alloy, Galvanized Steel, and Stainless Steel	Inside	None	None Required			**F**, **G**, **33**
Compressible Joints and Seals	Pressure Boundary	Elastomers	Inside and Air / Gas	Change in Material Properties	**One-Time Inspection Program**	VII.F1.1-b	**3.3.1-2**	**A**
VII.F1.4.2 *VII.F1.1.4*				Cracking	**One-Time Inspection Program**			**H**
				Loss of Material	**One-Time Inspection Program**	VII.F1.1-c	**3.3.1-2**	**A**

Table 3.3.2-9 (cont'd) Auxiliary Systems, Control Room Area Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Cooling Coil Units and Associated Refrigerant Piping (housings, coils, fins, drains, refrigerant lines)	Pressure Boundary	Carbon Steel (housing and condensate drains)	Air / Gas (wetted) Raw Water (includes drains and loop seal)	Loss of Material and Fouling (drains)	**One-Time Inspection Program**	VII.F1.1-a	**3.3.1-5**	**A**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
VII.F1.2.1 *VII.F1.3.1*	Pressure Boundary Exchange Heat	Copper Alloy (refrigerant piping & coils)	Air / Gas (wetted)	Loss of Material	**One Time Inspection Program**	VII.F1.2-a	**3.3.1-5**	**A**
			Dried Gas	None	None Required			**G** (coil) **F** (piping)
			Inside	None	None Required			**G**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**G**
	Exchange Heat	Aluminum (fins)	Air / Gas (wetted)	Loss of Material and Fouling	**One Time Inspection Program**			**F**, **20**

Table 3.3.2-9 (cont'd) Auxiliary Systems, Control Room Area Ventilation System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Ducts and Fittings *VII.F1.1.1*	Pressure Boundary	Galvanized Steel	Air / Gas and Inside	None	None Required			**G**
Equipment Frames and Housings (includes fan casings, filter housings, and dampers) *VII.F1.1.2,* *VII.F1.4.1*	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**
Fire Dampers (Frames and Housings Only) *VII.F1.1.2*	Pressure Boundary Fire Barrier	Stainless Steel and Galvanized Steel	Air / Gas and Inside	None	None Required			**F**, **G**

Table 3.3.2-9 (cont'd) Auxiliary Systems, Control Room Area Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flexible Connectors *VII.F1.1.3*	Pressure Boundary	Elastomers	Air / Gas and Inside	Change in Material Properties and Cracking	**One-Time Inspection Program**	VII.F1.1-b	**3.3.1-2**	**G**
				Loss of Material	**One-Time Inspection Program**	VII.F1.1-c	**3.3.1-2**	**G**
Piping (tubing) and Valve Bodies *VII.F1.3.1*	Pressure Boundary	Carbon Steel	Air / Gas (wetted) (intake butterfly valves only)	Loss of Material	**One-Time Inspection Program**	VII.F1.4-a	**3.3.1-5**	**C**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy and Stainless Steel	Air / Gas	None	None Required			**F, J**
			Inside	None	None Required			**F**, **J** (vlvs)

Table 3.3.2-10 Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.F2.1.1*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**, **33**
Compressible Joints and Seals *VII.F2.1.4*	Pressure Boundary	Elastomers	Air / Gas and Inside	Change in Material Properties, Cracking, and Loss of Material	**One-Time Inspection Program**			**G**
Ducts and Fittings *VII.F2.1.1*	Pressure Boundary	Galvanized Steel	Air / Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**G**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**

Table 3.3.2-10 (cont'd) Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Equipment Frames and Housings (exhaust fan casings, dampers, filter housings)	Pressure Boundary	Stainless Steel	Air / Gas	None	None Required			F
			Inside	None	None Required			F
		Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			G
VII.F2.1.2			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	A
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	A

Table 3.3.2-10 (cont'd) Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Cooling Units (housings and fan/coil fins only) *VII.F2.1.2* *VII.F2.2.1*	Pressure Boundary Exchange Heat	Carbon Steel and Copper Alloy (fins)	Air/Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.F2.1-a VII.F2.2-a		**A**
				Fouling (fins only)	**Service Water Program**			**H, 20**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
Fire Dampers (Frames and Housings Only) *VII.F2.1.2*	Pressure Boundary Fire Barrier	Galvanized Steel	Air / Gas	None	None Required			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**G**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**

Table 3.3.2-10 (cont'd) Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flexible Connectors *VII.F2.1.3*	Pressure Boundary	Elastomers	Air / Gas and Inside	Change in Material Properties and Cracking	**One-Time Inspection Program**			**G**
				Loss of Material	**One-Time Inspection Program**			**G**
Flow Orifice/Element	Flow Restriction Pressure Boundary	Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-10 (cont'd) Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
VII.F2.3.1			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**
Pitot Tube	Pressure Boundary	Copper Alloy	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-10 (cont'd) *Auxiliary Systems, Auxiliary and Radwaste Area Ventilation System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-11 Auxiliary Systems, Primary Containment Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume. 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.F3.1.1* *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**, **33**
		Stainless Steel	Inside	None	None Required			**F**, **33**
Compressible Joints and Seals *VII.F3.1.4*	Pressure Boundary	Elastomers	Air / Gas and Inside	Change in Material Properties, Cracking and Loss of Material	**One-Time Inspection Program**			**G**
Ducts and Fittings *VII.F3.1.1*	Pressure Boundary	Galvanized Steel	Air / Gas and Inside	None	None Required			**G**

Table 3.3.2-11 (cont'd) Auxiliary Systems, Primary Containment Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume. 2 Item**	**Table 1 Item**	**Notes**
Equipment Frames and Housings (includes cooling coil housings and cooling fins) *VII.F3.1.2* *VII.F3.2.1*	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.F3.1-a	**3.3.1-5**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**
	Exchange Heat (fins only)	Copper Alloy	Air / Gas (wetted)	Fouling	**Service Water Program**			**H, 20**
				Loss of Material	**One-Time Inspection Program**	VII.F3.2-a	**3.3.1-5**	**A**

Table 3.3.2-11 (cont'd) Auxiliary Systems, Primary Containment Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume. 2 Item**	**Table 1 Item**	**Notes**
Fire Dampers (Frames and Housings Only) *VII.F3.1.2*	Fire Barrier Pressure Boundary	Galvanized Steel	Air / Gas and Inside	None	None Required			**G**
Flexible Connectors *VII.F3.1.3*	Pressure Boundary	Elastomers	Air / Gas and Inside	Change in Material Properties, Cracking, and Loss of Material	**One-Time Inspection Program**			**G**
Flow Orifice/Element	Pressure Boundary	Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-11 (cont'd) *Auxiliary Systems, Primary Containment Ventilation System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume. 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
VII.F3.3.1			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**F**
Pitot Tube	Pressure Boundary	Copper Alloy	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-11 (cont'd) Auxiliary Systems, Primary Containment Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume. 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-12 Auxiliary Systems, Yard Structures Ventilation System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.F4.1.1* *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
Ducts and Fittings *VII.F4.1.1*	Pressure Boundary	Galvanized Steel	Air / Gas and Inside	None	None Required			**G**
Equipment Frames and Housings *VII.F4.1.2*	Flow Direction Pressure Boundary Fire Barrier (fire dampers only)	Galvanized Steel	Air / Gas and Inside	None	None Required			**G**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.F4.1-a	**3.3.1-5**	**A**

Table 3.3.2-13 Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Buried	Loss of Material	**Buried Piping and Tank Inspection Program**			**G**, **33**
			Inside and Outside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**, **33**
				Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
Fire Hydrants *VII.G.6.2*	Pressure Boundary	Cast Iron	Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
				Loss of Material (leaching)	**One-Time Inspection Program**			**H**
			Buried	None	None Required			**G**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**G**
Flexible Connectors	Pressure Boundary	Stainless Steel	Air / Gas, Dried Gas, and Inside	None	None Required			**J**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flow Orifice/Element	Flow Restriction Pressure Boundary	Stainless Steel	Raw Water (well water)	Loss of Material	**Fire Protection Program**			**J**
			Air / Gas and Inside	None	None Required			**J**
Fusible Links & Sprinkler Head Bulbs	Pressure Boundary	Copper Alloy Fibers, Foams, Ceramics and Lead alloys	Inside	None	None Required			**J**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Hose Station Nozzles and Hose Connections	Pressure Boundary	Aluminum	Air / Gas and Inside	None	None Required			**J**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**			**J**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**
		Cast Iron and Copper Alloy	Air / Gas	None	None Required			**J**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**D**
					One-Time Inspection Program (leaching only)			**J**, **66**
			Inside	Loss of Material (cast iron only)	**Borated Water Leakage Assessment and Evaluation Program**			**J**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Water System Piping and Valve Bodies *VII.G.6.1* *VII.G.6.2*	Pressure Boundary	Aluminum	Raw Water (well water)	Loss of Material	**Fire Protection Program**			**F**
			Air / Gas and Inside	None	None Required			**F**
		Carbon Steel	Air / Gas	Loss of Material	**Fire Protection Program**			**G**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-a VII.G.6-b	**3.3.1-21**	**B**
			Inside and Outside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program (inside only)**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Water System Piping and Valve Bodies (cont'd)	Pressure Boundary	Cast Iron	Air / Gas, Buried	None	None Required			**G**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-a VII.G.6-b	**3.3.1-21**	**B**
					One-Time Inspection Program (leaching only)			**H**, **66**
			Raw Water (well water) cement-lined pipe only	None	None Required			**F**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**G**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**G**

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Water System Piping and Valve Bodies (cont'd)	Pressure Boundary	Copper Alloy	Air / Gas	None	None Required			**F** (piping) **G** (valves)
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
					One-Time Inspection Program (leaching only)			**H**, **66**
			Inside	None	None Required			**F** (piping) **G** (valves)

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Water System Piping and Valve Bodies (cont'd)	Pressure Boundary	Galvanized Steel (pipe only)	Air / Gas	None	None Required			F
			Raw Water (well water)	Loss of Material	**Fire Protection Program**			F
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			F
		Stainless Steel (pipe only)	Air / Gas and Inside	None	None Required			G
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-a	3.3.1-21	B

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Gas System Piping and Valve Bodies	Pressure Boundary	Aluminum (piping only)	Air / Gas, Dried Gas, and Inside	None	None Required			J
		Carbon Steel	Air / Gas	Loss of Material	**Fire Protection Program**			J
			Buried (piping only)	Loss of Material	**Buried Piping and Tank Inspection Program**			J
			Dried Gas	None	None Required			J
			Inside and Outside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program (inside only)**	VII.I.1-a	3.3.1-14	C
					External Surfaces Monitoring Program	VII.I.1-b	3.3.1-5	C

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Gas System Piping and Valve Bodies	Pressure Boundary	Cast Iron (piping only)	Air / Gas and Dried Gas	None	None Required			**J**
(cont'd)			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**J**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**
		Copper Alloy	Air / Gas Dried Gas, and Inside	None	None Required			**J**
			Outside (valve only)	Loss of Material	**External Surfaces Monitoring Program**			**J**

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Gas System Piping and Valve Bodies (cont'd)	Pressure Boundary	Galvanized Steel (piping only)	Air / Gas and Dried Gas	None	None Required			**J**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**J**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**
Fuel Oil System Piping and Valve Bodies VII.G.8.1	Pressure Boundary	Aluminum (pipe only)	Air / Gas	None	None Required			**F**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil System Piping and Valve Bodies (cont'd)	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**Fire Protection Program**			**G**
			Fuel Oil (piping only)	Loss of Material	**Fire Protection Program** **Fuel Oil Chemistry Control Program**	VII.G.8-a	**3.3.1-22**	**B**
			Inside (piping only) and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Cast Iron (valves only)	Air / Gas	None	None Required			**F**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**F**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Fuel Oil System Piping and Valve Bodies (cont'd)	Pressure Boundary	Copper Alloy	Air / Gas (piping only)	None	None Required			**F**
			Fuel Oil	Loss of Material	**Fire Protection Program** **Fuel Oil Chemistry Control Program**			**J** (valves) **F** (piping)
			Buried (piping only)	Loss of Material	**Buried Piping and Tank Inspection Program**			**F**
			Inside	None	None Required			**J** (valves) **F** (piping)
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J** (valves) **F** (piping)

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pump Casings	Pressure Boundary	Cast Iron	Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
VII.G.6.2				Loss of Material (leaching)	**One-Time Inspection Program**			**H**, **66**
			Inside	None	None Required			**G**
Sight Glasses	Pressure Boundary	Glass	Raw Water (well water) and Inside	None	None Required			**J**
Spray Shield	Flow Direction	Aluminum	Inside	None	None Required			**J**
		Galvanized Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**J**

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Sprinkler Heads *VII.G.6.2*	Pressure Boundary Flow Distribution	Copper Alloy	Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
				Loss of Material (leaching)	**One-Time Inspection Program**			**H**, **66**
			Air / Gas and Inside	None	None Required			**G**
Strainers (element) *VII.G.6.2*	Debris Protection	Stainless Steel	Air / Gas	None	None Required			**G**
			Raw Water (well water)	Loss of Material and Fouling	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Strainers (shell) *VII.G.6.2*	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**Fire Protection Program**			**G**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**
		Cast Iron and Copper Alloy	Air / Gas	None	None Required			**G**
			Raw Water (well water)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**B**
					One-Time Inspection Program (leaching only)			**H**, **66**
			Inside	Loss of Material (cast iron only)	**Borated Water Leakage Assessment and Evaluation Program**			**G**

Table 3.3.2-13 (cont'd) Auxiliary Systems, Fire Protection – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Tank Protective Fiberglass Cover	Environ-mental Control	Fiberglass	Outside	Loss of Material	**Fire Protection Program**			**J**
Water System Tanks	Pressure Boundary	Carbon Steel	Air / Gas (vapor spaces)	Loss of Material	**Fire Protection Program**			**J**
			Raw Water (well water) (fire protection tank)	Loss of Material	**Fire Protection Program**	VII.G.6-b	**3.3.1-21**	**D**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Gas System Tanks	Pressure Boundary	Carbon Steel	Dried Gas (CO_2 tanks)	None	None Required			**J**
			Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-13 (cont'd) *Auxiliary Systems, Fire Protection – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Fuel Oil System Tanks	Pressure Boundary	Carbon Steel	Air / Gas (vapor spaces)	Loss of Material	**Fire Protection Program**			**J**
			Fuel Oil (fire diesel fuel oil storage tank)	Loss of Material	**Fuel Oil Chemistry Control Program** **One-Time Inspection Program**	VII.G.8-a	**3.3.1-22**	**C**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Thermal Insulation (CO_2 Tank)	Environ-mental Control	Fibers, Foams, Ceramics	Inside	Change in Material Properties and Cracking	**Fire Protection Program**			**J**

Table 3.3.2-14 Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VII.H1.2.2* *VII.H1.3.2* *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**, **33**
Piping *VII.H1.1.1* *VII.H1.1.2*	Pressure Boundary	Carbon Steel and Alloy Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**G**
			Inside (includes piping in protective trench)	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.H1.1-a	**3.3.1-5**	**A**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**	VII.H1.1-b	**3.3.1-18**	**B**
			Embedded	None	None Required			**G**
			Air/Gas	Loss of Material	**One Time Inspection**			**J, 18**

Table 3.3.2-14 (cont'd) Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping, (cont'd)	Pressure Boundary	Copper and Ni-Cu Alloys	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**F**
			Inside	None	None Required			**F**
		Stainless Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**F**
			Inside (includes piping in guard pipe)	None	None Required			**F**
			Inside – In protective trench	Loss of Material	**One-Time Inspection Program**			**F**, **16**
Guard Pipe	Shelter/ Protection	Carbon Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
			Air / Gas	None	None Required			**J**, **17**

Table 3.3.2-14 (cont'd) *Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Fuel Oil Transfer Pump Casings *VII.H1.3.1*	Pressure Boundary	Carbon Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**G**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.H1.3-a	**3.3.1-5**	**A**
			Air/Gas	None	None Required			**G, 18**
		Stainless Steel (bowls only)	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**F**
EDG Priming and Engine-Driven Pump Casings *VII.H1.3.1*	Pressure Boundary	Carbon Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel and Cast Iron	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**F**
			Inside	None	None Required			**F**
Strainers (elements)	Debris Protection	Stainless Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**J**

Table 3.3.2-14 (cont'd) Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Strainers (shell)	Pressure Boundary	Carbon Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Fuel Oil Storage Tanks (tanks and manway structure, including piping, pump casings, and valves inside the tank) *VII.H1.4.1* *VII.H1.4.2*	Pressure Boundary Structural Support	Carbon Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**	VII.H1.4-a	**3.3.1-7**	**B**, **18**
			Air / Gas (tank vapor space)	None	None Required			**G**, **18**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**	VII.H1.1-b	**3.3.1-18**	**B**
			Outside (includes manway structure)	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-14 (cont'd) Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
EDG Day Tanks (including piping, pump casings, and valves inside the tank)	Pressure Boundary	Carbon Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**	VII.H2.5-a	**3.3.1-7**	**B**, **18**
			Air / Gas (tank vapor space)	None	None Required			**G**, **18**
VII.H2.5.1			Inside (includes vent lines)	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Valve Bodies	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
VII.H1.2.1			Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.H1.2-a	**3.3.1-5**	**A**
		Copper Alloy and Stainless Steel	Fuel Oil	Loss of Material	**Fuel Oil Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.3.2-14 (cont'd) Auxiliary Systems, Diesel Fuel Oil System – Summary of Aging Management Review Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Vent Screen (vent cap and screen)	Debris Protection	Carbon Steel	Outside	Loss of Material	**One Time Inspection Program**			**J**

Table 3.3.2-15 Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Air Accumulators (starting air system) *VII.H2.2.4*	Pressure Boundary	Carbon Steel	Dried Gas	None	None Required			G
			Air/Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	3.3.1-5	A
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	3.3.1-5	A
Closure Bolting *VII.I.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	3.3.1-5	A, 33
Ducts and Fittings (intake / exhaust system, including silencers) *VII.H2.3.1* *VII.H2.4.1* *VII.H2.4.2*	Pressure Boundary	Carbon Steel (intake / exhaust air, scavenging air)	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.3-a	3.3.1-5	A
			Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	3.3.1-5	A
		Stainless Steel (exhaust)	Air / Gas (wetted)	Cracking and Loss of Material	**One-Time Inspection Program**			F
			Outside	None	None Required			F

Table 3.3.2-15 (cont'd) *Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Electric Heaters (jacket water and lube oil heater casings)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**D**
			Lube Oil	None	None Required			**J**, **23**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Equipment Frames and Housings (crankcase ventilation)	Pressure Boundary	Cast Iron	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.4-a	**3.3.1-5**	**C**
			Inside	None	None Required			**J**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Filters (casing) (air start system) *VII.H2.2.1*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	**3.3.1-5**	**A**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Stainless Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas and Inside	None	None Required			**F**
Filters (casing) (lube oil system)	Pressure Boundary	Carbon Steel and Cast Iron	Lube Oil	None	None Required			**J**, **23**
		Cast Iron	Inside	None	None Required			**J**
		Carbon Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flow Orifice/Element (cooling water system) *VII.H2.1.1*	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**B**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Heat Exchanger (channel head and shell) (lube oil system coolers) .	Pressure Boundary	Carbon Steel	Raw Water (channel side)	Loss of Material	**Service Water Program**	VII.H2.1-b	**3.3.1-17**	**C**
			Lube Oil (shell side)	None	None Required			**J**, **23**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Heat Exchanger (tubes / tube sheet) (lube oil system coolers)	Pressure Boundary Exchange Heat	Copper Alloy	Lube Oil (shell side)	None	None Required			**J**, **23**
			Raw Water (tube side)	Loss of Material and Fouling	**Service Water Program**			**J**
				Loss of Material (leaching)	**One-Time Inspection Program**			**J**
Heat Exchanger (channel head and shell) (Air coolant, intercooler, and jacket cooling water system) *VII.C1.3.1* *VII.C1.3.3*	Pressure Boundary	Carbon Steel	Raw Water (channel side)	Loss of Material	**Service Water Program**	VII.H2.1-b	**3.3.1-17**	**C**
			Closed Cooling Water (shell side)	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**D**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Heat Exchanger (tubes / tube sheet) (Air coolant, intercooler, and jacket cooling water system) *VII.C1.3.4* *VII.C1.3.5*	Pressure Boundary Exchange Heat	Copper Alloy	Closed Cooling Water (shell side)	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**			**F**
			Raw Water (tube side)	Loss of Material and Fouling	**Service Water Program**			**F**
				Loss of Material (leaching)	**One-Time Inspection Program**			**F**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (air start system) *VII.H2.2.1*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	**3.3.1-5**	**A**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy	Air / Gas, Dried Gas, and Inside	None	None Required			**F**
		Stainless Steel	Air / Gas (wetted)	Cracking and Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas and Inside	None	None Required			**F**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (lube oil system)	Pressure Boundary	Carbon Steel, Cast Iron, and Copper Alloy	Lube Oil	None	None Required			**J**, **23**
			Inside	Loss of Material (Carbon Steel only)	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Piping (cooling water system) *VII.H2.1.1*	Pressure Boundary	Carbon Steel And Cast Iron	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**B**
			Raw Water (heat exchanger interconnect-ing piping)	Loss of Material and Fouling	**Service Water Program**	VII.H2.1-b	**3.3.1-17**	**A**
			Inside	Loss of Material (carbon steel only)	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (cont'd) (cooling water system)	Pressure Boundary	Copper Alloy and Stainless Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**
Pump Casings (lube oil system)	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**J**, **23**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Pump Casings (cooling water system)	Pressure Boundary	Carbon Steel and Cast Iron	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**B**
			Inside	Loss of Material (Carbon Steel only)	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Strainers (element) (air start system) *VII.H2.2.1*	Debris Protection	Stainless Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas	None	None Required			**F**
Strainers (element) (lube oil system)	Debris Protection	Stainless Steel	Lube Oil	None	None Required			**J**, **23**
Strainers (shell) (air start system) *VII.H2.2.1*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	**3.3.1-5**	**A**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
Strainers (shell) (lube oil system)	Pressure Boundary	Cast Iron	Lube Oil	None	None Required			**J**, **23**
			Inside	None	None Required			**J**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Tanks (lube oil system – rocker arm reservoirs)	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**J**, **23**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Tanks (cooling water system expansion tanks)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**D**
			Air / Gas (wetted) (vapor space)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	**3.3.1-5**	**C**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies (air start system) *VII.H2.2.2*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**	VII.H2.2-a	**3.3.1-5**	**A**
			Dried Gas	None	None Required			**G**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**
		Copper Alloy	Air / Gas (wetted)	Cracking and Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas and Inside	None	None Required			**F**
		Stainless Steel	Air / Gas (wetted)	Cracking and Loss of Material	**One-Time Inspection Program**			**F**
			Dried Gas and Inside	None	None Required			**F**

Table 3.3.2-15 (cont'd) *Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies (lube oil system)	Pressure Boundary	Carbon Steel, Cast Iron, and Copper Alloy	Lube Oil	None	None Required			**J**, **23**
			Inside (carbon steel only)	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Valve Bodies (cooling water system)	Pressure Boundary	Carbon Steel and Cast Iron	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VII.H2.1-a	**3.3.1-15**	**D**
			Raw Water (heat exchanger interconnect-ing lines)	Loss of Material and Fouling	**Service Water Program**	VII.H2.1-b	**3.3.1-17**	**C**
			Inside	Loss of Material (carbon steel only)	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-15 (cont'd) Auxiliary Systems, Emergency Diesel Generator System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies (cooling water system) (cont'd)	Pressure Boundary	Copper Alloy and Stainless Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.3.2-16 Auxiliary Systems, Demineralized Water System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Closure Bolting	Pressure Boundary	Carbon Steel and Alloy Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
Filters (casing)	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VIII.G.1-c	**3.4.1-2**	**C**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-16 (cont'd) Auxiliary Systems, Demineralized Water System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Piping	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VIII.G.1-c	**3.4.1-2**	**C**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
		Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**	VIII.G.4-b	**3.4.1-2**	**D**
			Inside	None	None Required			**J**

Table 3.3.2-16 (cont'd) Auxiliary Systems, Demineralized Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One Time Inspection Program**	VIII.G.3-a	**3.4.1-2**	**C**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
		Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**	VIII.G.4-b	**3.4.1-2**	**D**
			Inside	None	None Required			**J**

Table 3.3.2-17 Auxiliary Systems, High Energy Line Break Detection System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping and Valve Bodies	Pressure Boundary	Stainless Steel	Air / Gas and Inside	None	None Required			J

Table 3.3.2-18 Auxiliary Systems, Hydrogen Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C, 33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**, **33**
Equipment Frames and Housings	Flow Direction Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
		Stainless Steel	Air / Gas and Inside	None	None Required			**J**
Filters (casing)	Pressure Boundary	Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-18 (cont'd) Auxiliary Systems, Hydrogen Control System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Flow Orifice/Element (annubar)	Pressure Boundary, Flow Restriction	Stainless Steel	Air / Gas and Inside	None	None Required			**J**
Hydrogen Recombiner	Flow Direction	Stainless Steel	Air / Gas and Inside	None	None Required			**J**
Piping	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
		Stainless Steel	Air / Gas and Inside	None	None Required			**J**

Table 3.3.2-18 (cont'd) *Auxiliary Systems, Hydrogen Control System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Sample Analyzer (Pressure retaining components)	Pressure Boundary	Stainless Steel	Air / Gas, Dried Gas, and Inside	None	None Required			J
Valve Bodies	Pressure Boundary	Stainless Steel	Air / Gas and Inside	None	None Required			J

Table 3.3.2-19 Auxiliary Systems, Liquid Waste and Drains – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
RCP Oil Collection System								
Flexible Connectors	Pressure Boundary	Stainless Steel	Lube Oil (potentially contaminated with water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	None	None Required			**J**
Piping, Valve Bodies, and Tanks *VII.G.7.1* *VII.G.7.2*	Pressure Boundary	Carbon Steel	Air / Gas (wetted)	Loss of Material	**One-Time Inspection Program**			**G**
			Lube Oil (potentially contaminated with water)	Loss of Material	**One-Time Inspection Program**	VII.G.7-a VII.G.7-b	**3.3.1-6**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**A**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**A**

Table 3.3.2-19 (cont'd) Auxiliary Systems, Liquid Waste and Drains – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Liquid Waste and Drains								
Closure Bolting	Pressure Boundary	Alloy Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**, **33**
		Stainless Steel	Inside	None	None Required			**J**, **33**
Floor Drain Plug	Pressure Boundary	Galvanized Steel	Air / Gas (wetted) and Inside	Loss of material	**One-Time Inspection Program**			**J**
		Elastomers	Air / Gas (wetted) and Inside	Change in Material Properties and Cracking	**One-Time Inspection Program**			**J**

Table 3.3.2-19 (cont'd) Auxiliary Systems, Liquid Waste and Drains – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping and Valve Bodies	Pressure Boundary	Carbon Steel	Air / Gas Raw Water	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**
		Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Raw Water	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	None	None Required			**J**

Table 3.3.2-20 Auxiliary Systems, Oil-Static Cable Pressurization System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel and Carbon Steel	Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**, **33**
Piping	Pressure Boundary	Carbon Steel	Dried Gas and Lube Oil	None	None Required			**J**
			Buried	Loss of Material	**Buried Piping and Tank Inspection Program**			**J**
			Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
		Copper Alloy	Lube Oil and Inside	None	None Required			**J**

Table 3.3.2-20 (cont'd) Auxiliary Systems, Oil-Static Cable Pressurization System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (cont'd)	Pressure Boundary	Elastomers	Dried Gas	None	None Required			J
			Inside	Change in Material Properties, Cracking, and Loss of Material	**External Surfaces Monitoring Program**			J
		Stainless Steel	Dried Gas, Lube Oil, and Inside	None	None Required			J
Pump Casings	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			J
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	3.3.1-5	C

Table 3.3.2-20 (cont'd) Auxiliary Systems, Oil-Static Cable Pressurization System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Tanks	Pressure Boundary	Carbon Steel	Dried Gas and Lube Oil	None	None Required			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
Valve Bodies	Pressure Boundary	Carbon Steel	Dried Gas and Lube Oil	None	None Required			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
		Copper Alloy	Dried Gas, Lube Oil, Inside	None	None Required			**J**
			Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**

Table 3.3.2-21 Auxiliary Systems, Potable and Sanitary Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel	Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**, **33**
		Stainless Steel	Inside	None	None Required			**J**, **33**
Heat Exchanger (shell and channel head)	Pressure Boundary	Carbon Steel	Treated Water (unmonitored demineralized water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-21 (cont'd) Auxiliary Systems, Potable and Sanitary Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel	Raw Water (potable) and Treated Water (unmonitored demineralized water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
		Copper Alloy and Stainless Steel	Raw Water (potable)	Loss of Material	**One-Time Inspection Program**			**J**, **30**
			Inside	None	None Required			**J**
Strainers (shell)	Pressure Boundary	Carbon Steel	Treated Water (unmonitored demineralized water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-21 (cont'd) *Auxiliary Systems, Potable and Sanitary Water System – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Tanks	Pressure Boundary	Carbon Steel	Raw Water (potable) and Treated Water (unmonitored demineralized water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-21 (cont'd) Auxiliary Systems, Potable and Sanitary Water System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Raw Water (potable) and Treated Water (unmonitored demineralized water)	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**
		Copper Alloy and Stainless Steel	Raw Water (potable)	Loss of Material	**One-Time Inspection Program**			**J**, **30**
			Inside	None	None Required			**J**

Table 3.3.2-23 Auxiliary Systems, Reactor Makeup Water Storage System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**, **33**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**, **33**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**, **33**
		Stainless Steel	Inside and Outside	None	None Required			**J**, **33**
Flow Orifice/Element	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Outside	None	None Required			**J**
Piping	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-23 (cont'd) Auxiliary Systems, Reactor Makeup Water Storage System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping (cont'd)	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Inside and Outside	None	None Required			**J**
Pump Casings	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Outside	None	None Required			**J**
Reactor Makeup Water Storage Tanks	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Outside	None	None Required			**J**
Valve Bodies	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Inside and Outside	None	None Required			**J**

Table 3.3.2-24 Auxiliary Systems, Sampling System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Closure Bolting	Pressure Boundary	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**, **33**
VII.I.2					**External Surfaces Monitoring Program**	VII.I.1-b	**3.3.1-5**	**C**, **33**
Sample Cooler Heat Exchanger (shell)	Pressure Boundary	Carbon Steel	Closed Cooling Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.EI.8-v	**3.3.1-15**	**D**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VII.I.1-a	**3.3.1-14**	**C**
					External Surfaces Monitoring Program	VII.I.1-b	**3.3.1-5**	**C**

Table 3.3.2-24 (cont'd) Auxiliary Systems, Sampling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Sample Cooler Heat Exchanger (tubes)	Exchange Heat Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**D**
				Loss of Material	**Water Chemistry Control Program**			**J**, **39**
			Closed Cooling Water	Loss of Material	**Water Chemistry Control Program**			**J**, **39**
				Cracking	**Water Chemistry Control Program**	VII.E1.8-b	**3.3.1-9**	**D**
Piping	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**			**J**
				Loss of Material	**Water Chemistry Control Program**			**J**, **39**
			Treated Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**

Table 3.3.2-24 (cont'd) Auxiliary Systems, Sampling System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Stainless Steel	Borated Water	Cracking	**Water Chemistry Control Program**			**J**
				Loss of Material	**Water Chemistry Control Program**			**J**, **39**
			Treated Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**

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

16. The One-Time Inspection Program is being applied to stainless tubing in pipe trenches in the EDG rooms to provide data on whether the trench environment promotes corrosion of this material.
17. Since the guard pipe is sealed on both ends, there is no source of moisture or oxygen to support corrosion on its interior surface. Therefore, no aging management program is needed for the interior surface.
18. OE provided by existing inspection program and previously performed inspections indicates that the Fuel Oil Chemistry Control Program is adequate to manage aging of the DFOSTs. Aging of the day tanks is bounded by aging of the storage tanks.
20. NUREG-1801 Volume 2, sections VII.F1, VII.F2, VII.F3, and VII.F4 do not identify fouling as an aging effect for heating/cooling coils. FNP has identified fouling as an aging effect requiring management.
23. FNP lube oil systems are not considered to be subject to water contamination. Operating history supports this conclusion.
27. The air/gas environment for this component is either nitrogen or hydrogen, with no oxygen. Therefore, loss of material is not an aging effect requiring management for the internal surfaces of this component.
29. Stress corrosion cracking is possible since operating temperatures exceed the threshold temperature of 140°F.
30. Stress corrosion cracking is not possible since operating temperatures are below the threshold temperature of 140°
33. The FNP process addresses bolting as a commodity regardless of the component type with which the bolting is associated.
36. The NUREG-1801 program only addresses primary water chemistry. Closed cooling water chemistry is the applicable FNP subprogram.
37. Erosion of the letdown orifices is an aging mechanism of concern. FNP will perform a one time inspection of one orifice to detect loss of material due to erosion.
38. It is assumed that the cast steel in the referenced NUREG-1801 item is intended to be cast iron.
39. Localized corrosion is assumed for all stainless steel components exposed to a borated water or closed cooling water environment.
56. Aging effect matches with GALL but not Aging Mechanism.
66. A one time inspection is provided to address the potential for selective leaching.

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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 FNP 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 System (**Section 2.3.4.3**)
- Auxiliary Feedwater System (**Section 2.3.4.4**)
- Auxiliary Steam and Condensate Recovery System (**Section 2.3.4.5**)

Table 3.4.1, Summary of Aging Management Evaluations for Steam and Power Conversion Systems in Chapter VIII of NUREG-1801, provides a summary comparison of the FNP 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 3.0.3**.

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, Steam and Power Conversion Systems, Main Steam System – Summary of Aging Management Review

Table 3.4.2-2, Steam and Power Conversion Systems, Feedwater System – Summary of Aging Management Review

Table 3.4.2-3, Steam and Power Conversion Systems, Steam Generator Blowdown System – Summary of Aging Management Review

Table 3.4.2-4, Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Table 3.4.2-5, Steam and Power Conversion Systems, Auxiliary Steam and Condensate Recovery 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 System (**Section 3.4.2.1.3**)
- Auxiliary Feedwater System (**Section 3.4.2.1.4**)
- Auxiliary Steam and Condensate Recovery 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 components of the Main Steam System requiring an aging management review are:

- alloy steel
- carbon steel
- stainless steel

Environments

Components of the Main Steam System are exposed to the following environments:

- steam
- air/gas
- inside (with the potential for borated water leaks)
- outside
- treated water

Aging Effects Requiring Management

The following aging effects associated with Main Steam System components require management:

- cracking
- loss of material

The operating experience review for the Main Steam System identified vibration in the Unit 2 main steam lines as a plant-specific issue requiring further review. The Unit 1 main steam lines do not have a similar history.

Pipe support damage attributed to steam line vibration occurred on several occasions on the Unit 2 Main Steam System. Initial corrective actions taken to repair and modify the hangers were unsuccessful at eliminating the problem. During the Unit 2 Spring 2001 refueling outage, damage was discovered on several Main Steam System piping supports. SNC initiated a comprehensive investigation that included support inspections, and an extensive root cause investigation that included an expert review panel. The root cause investigation concluded the main steam line vibration was flow-induced and caused by flow disturbances in the cross-tie header in the Main Steam Valve Room (MSVR) and at the high pressure turbine inlet (in the Turbine Building). Corrective actions included changes to the main steam piping supports in the Unit 2 Containment Building, MSVR, and Turbine Building. In conjunction with changes to the pipe support configurations, vibration dampeners were installed at appropriate locations to mitigate the vibration. Vibration monitoring and inspections were performed to validate the success of the corrective actions. The piping stress has been evaluated and determined to be acceptable for the damaged support incidents.

The Unit 2 Main Steam System vibration has been mitigated by design changes. Thus, piping vibration is not considered to be an aging effect requiring management for the renewal term. Vibration monitoring and inspections will continue until SNC management is satisfied that the problem has been corrected. Additional corrective actions will be taken if determined necessary.

Aging Management Programs

The following programs manage the aging effects requiring management for the Main Steam System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- Flow Accelerated Corrosion Program (**Appendix B.4.1**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.4.2.1.2 Feedwater System Aging Management Review Results

Materials

The materials of construction for the components of the Feedwater System requiring an aging management review are:

- alloy steel
- carbon steel
- stainless steel

Environments

Components of the Feedwater System are exposed to the following environments:

- treated water
- inside (with the potential for borated water leaks)
- outside

Aging Effects Requiring Management

The following aging effects associated with Feedwater System components require management:

- cracking
- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Feedwater System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- Flow Accelerated Corrosion Program (**Appendix B.4.1**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.4.2.1.3 Steam Generator Blowdown System Aging Management Review Results

Materials

The materials of construction for the components of the Steam Generator Blowdown System requiring an aging management review are:

- alloy steel
- carbon steel
- stainless steel

Environments

Components of the Steam Generator Blowdown System are exposed to the following environments:

- treated water
- inside (with the potential for borated water leaks)

Aging Effects Requiring Management

The following aging effects associated with Steam Generator Blowdown System components require management:

- cracking
- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Steam Generator Blowdown System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- Flow Accelerated Corrosion Program (**Appendix B.4.1**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.4.2.1.4 Auxiliary Feedwater System Aging Management Review Results

Materials

The materials of construction for the components of the Auxiliary Feedwater System requiring an aging management review are:

- alloy steel
- carbon steel
- stainless steel

Environments

Components of the Auxiliary Feedwater System are exposed to the following environments:

- treated water
- raw water
- lube oil
- inside
- outside

Aging Effects Requiring Management

The following aging effects associated with Auxiliary Feedwater System components require management:

- loss of material
- fouling

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Feedwater System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Service Water Program (**Appendix B.4.4**) (cross-tie to Open Cycle Cooling Water System only)

3.4.2.1.5 Auxiliary Steam and Condensate Recovery System Aging Management Review Results

Materials

The materials of construction for the components of the Auxiliary Steam and Condensate Recovery System requiring an aging management review are:

- alloy steel
- carbon steel
- stainless steel
- cast iron

Environments

Components of the Auxiliary Steam and Condensate Recovery System are exposed to the following environments:

- treated water (and steam)
- inside (with the potential for borated water leaks)

Aging Effects Requiring Management

The following aging effects associated with Auxiliary Steam and Condensate Recovery System components require management:

- loss of material
- cracking

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Steam and Condensate Recovery System components:

- Water Chemistry Control Program (**Appendix B.3.2**)
- Flow Accelerated Corrosion Program (**Appendix B.4.1**)
- One-Time Inspection Program (**Appendix B.5.5**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.4.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Steam and Power Conversion Systems

NUREG-1801 identifies those component, material, environment, aging effect, and aging management program combinations evaluated in NUREG-1801 that warrant further evaluation in a license renewal application. NUREG-1800 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants) outlines the specific issues requiring further evaluation. For the Steam and Power Conversion systems, those programs are addressed in the following sections.

3.4.2.2.1 Cumulative Fatigue Damage

For Class 2 and 3 piping components, fatigue is a 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 in **Section 4.3**.

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

The FNP AMR results are consistent with this summary item for those components within the FNP license renewal scope. The FNP Water Chemistry Control Program (**Appendix B.3.2**) and One-Time Inspection Program (**Appendix B.5.5**) will manage loss of material due to corrosion in carbon steel components.

3.4.2.2.3 Loss of Material due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

The FNP AMR results are consistent with this summary item. The FNP Auxiliary Feedwater System contains a cross-tie to the Open Cycle Cooling Water System. Loss of material in this section of cross-tie piping will be managed by the Service Water Program (**Appendix B.4.4**).

3.4.2.2.4 General Corrosion

The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material on carbon steel component exterior surfaces subject to corrosion.

Components operating at temperatures exceeding 212 °F are not considered to be subject to general corrosion since the elevated operating temperature prevents moisture from remaining on the component surface.

3.4.2.2.5 Loss of Material due to General, Pitting, Crevice, and Microbiologically Influenced Corrosion

(1) Loss of material was determined not to be an aging effect requiring management for the Auxiliary Feedwater System Turbine lube oil cooling system. Water intrusion is not a credible occurrence since the system is closed. A review of FNP operating experience does not indicate any significant water intrusion events.

The lube oil is cooled with treated water supplied from the FNP Condensate Storage Tank. The FNP Water Chemistry Program and One-Time Inspection

Program will manage aging of the lube oil heat exchanger components, such that the integrity of the lube oil system will be maintained.

(2) This further evaluation item addresses loss of material in underground condensate storage tanks and auxiliary feedwater system piping. The FNP Condensate Storage Tank and AFW System piping are not buried. Therefore, this item is not applicable to FNP.

3.4.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the steam and power conversion systems components. The LRA section that contains the TLAA review results is indicated in parentheses.

- Metal Fatigue (**Section 4.3.3**)

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	Piping and fittings in main feedwater line, steam line and auxiliary feedwater (AFW) piping (PWR only)	Cumulative fatigue damage	TLAA, evaluated in accordance with10 CFR 54.21(c)	Yes, TLAA	The FNP AMR results are consistent with this summary item with regard to fatigue of Class 2 and 3 piping systems. See **Section 3.4.2.2.1** for further discussion.
3.4.1-2	Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except main steam system)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water Chemistry and one-time inspection	Yes, detection of aging effects is to be further evaluated	The FNP AMR Results are consistent with this summary item as applicable to FNP. See **Section 3.4.2.2.2** for further discussion.
3.4.1-3	AFW piping	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Plant specific	Yes, plant specific	The FNP AMR Results are consistent with this summary item. 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
3.4.1-4	Oil coolers in AFW system (lubricating oil side possibly contaminated with water)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion and MIC	Plant specific	Yes, plant specific	Loss of material was determined not to be an aging effect requiring management for the Auxiliary Feedwater System Turbine lube oil cooling system. See **Section 3.4.2.2.5** (1).
3.4.1-5	External surface of carbon steel components	Loss of material due to general corrosion	Plant specific	Yes, plant specific	The FNP AMR results are consistent with this summary item. See **Section 3.4.2.2.4** for further discussion.
3.4.1-6	Carbon steel piping and valve bodies	Wall thinning due to flow-accelerated corrosion	Flow-accelerated corrosion	No	The FNP Flow Accelerated Corrosion Program (**Appendix B.4.1**) will manage loss of material due to flow accelerated corrosion in Main Steam, Steam Generator Blowdown, Feedwater, and Auxiliary Steam and Condensate Recovery System piping, fittings, and valves. The FNP AMR results are consistent with this summary item with the following clarification: loss of material due to flow accelerated corrosion (FAC) is not an aging effect requiring management for portions of the Main Steam System with high quality steam

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	Carbon steel piping and valve bodies in main steam system	Loss of material due to pitting and crevice corrosion	Water chemistry	No	The FNP AMR results are consistent with this summary item. The FNP Water Chemistry Control Program (**Appendix B.3.2**) will manage loss of material in Main Steam System 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
3.4.1-8	Closure bolting in high-pressure or high-temperature systems	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC.	Bolting Integrity	No	The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material due to general corrosion in carbon and alloy steel bolting. Cracking due to SCC is not an aging effect requiring management for the FNP closure bolting. The bolting material selection in conjunction with sound maintenance practices (control of bolt torquing, proper lubricants and sealing compounds) has been effective in eliminating SCC of bolting at FNP. Industry data and our review of plant-specific operating experience support 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
3.4.1-9	Heat exchangers and coolers/ condensers serviced by open-cycle cooling water	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system	No	This summary item is not applicable to FNP. There are no heat exchangers and coolers/condensers in any Steam and Power Conversion Systems that are in-scope for license renewal and serviced by open cycle cooling water systems as described by NUREG-1801 Volume 2.
3.4.1-10	Heat exchangers and coolers/ condensers serviced by closed cycle cooling water	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed cycle cooling water system	No	This summary item is not applicable to FNP. There are no heat exchangers and coolers/condensers in any Steam and Power Conversion Systems that are in-scope for license renewal and serviced by closed cycle cooling water systems as described by NUREG-1801 Volume 2.
3.4.1-11	External surface of above ground condensate storage tank	Loss of material due to general (carbon steel only), pitting . and crevice corrosion	Aboveground carbon steel tanks	No	The FNP External Surfaces Monitoring Program (**Appendix B.5.3**) will manage loss of material of the external surfaces of the FNP Condensate Storage Tanks. The FNP External Surfaces Monitoring Program is consistent with the intent of the NUREG-1801 Volume 2, XI.M29.

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
3.4.1-12	External surface of buried condensate storage tank and AFW piping	Loss of material due to general, pitting, and crevice corrosion and MIC	Buried piping and tanks surveillance or Buried piping and tanks inspection	No Yes, detection of aging effects and operating experience are to be further evaluated	This summary item is not applicable to FNP. The FNP Condensate Storage Tank and AFW System piping are not buried. Also see **Section 3.4.2.2.5 (2)**
3.4.1-13	External surface of carbon steel components	Loss of material due to boric acid corrosion	Boric Acid corrosion	No	The FNP AMR results are consistent with this summary item. FNP includes carbon and alloy steel bolting in this summary item. The FNP Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**) will manage loss of material due to boric acid corrosion. The Auxiliary Feedwater System components are not located in close proximity to borated water containing components and consequently are not susceptible to this aging mechanism.

Table 3.4.2-1 Steam and Power Conversion Systems, Main Steam System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VIII.H.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21, 33**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**A, 33**
			Outside	None	None Required			**21, 33**
Flow Orifice/Element	Flow Restriction Pressure Boundary	Stainless Steel	Steam and Treated Water (drain line orifice)	Cracking	**Water Chemistry Control Program**			**J**
				Loss of Material	**Water Chemistry Control Program**			**J**
			Inside and Outside	None	None Required			**J**

Table 3.4.2-1 (cont'd) Steam and Power Conversion Systems, Main Steam System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping *VIII.B1.1.1* *VIII.B1.1.2* *VIII.B1.1.3*	Pressure Boundary Flow Direction (MS Safety and Atmos. Relief Valve Vent Stacks Only)	Carbon Steel	Steam and Treated Water (drains)	Loss of Material	**Water Chemistry Control Program**	VIII.B1.1-a	**3.4.1-7**	**A**
					Flow-Accelerated Corrosion Program	VIII.B1.1-c	**3.4.1-6**	**A, 40**
			Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**A**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
		Stainless Steel	Steam	Cracking and Loss of Material	**Water Chemistry Control Program**			**F**
			Inside and Outside	None	None Required			**F**

Table 3.4.2-1 (cont'd) Steam and Power Conversion Systems, Main Steam System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Steam/Fluid Traps	Pressure Boundary	Alloy Steel	Steam and Treated Water	Loss of Material	**Water Chemistry Control Program**			**J**
			Outside	None	None Required			**J, 21**
Turbine Pump Drive Casings	Pressure Boundary	Carbon Steel	Air / Gas	Loss of Material	**One-Time Inspection Program**			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**C**

Table 3.4.2-1 (cont'd) Steam and Power Conversion Systems, Main Steam System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Valve Bodies *VIII.B1.2.1*	Pressure Boundary	Carbon Steel	Steam and Treated Water (drains)	Loss of Material	**Flow-Accelerated Corrosion Program**	VIII.B1.2-b	**3.4.1-6**	**A, 40**
					Water Chemistry Control Program	VIII.B1.2-a	**3.4.1-7**	**A**
			Air / Gas	Loss of Material	**One-Time Inspection Program**			**G**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**A**
			Outside	None	None Required			**21**
		Stainless Steel	Steam	Cracking And Loss of Material	**Water Chemistry Control Program**			**F**
			Inside and Outside	None	None Required			**F**

Table 3.4.2-2 Steam and Power Conversion Systems, Feedwater System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG- 1801 Volume 2 Item	Table 1 Item	Notes
Closure Bolting *VIII.H.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21, 33**
			Outside	None	None Required			**21, 33**

Table 3.4.2-2 (cont'd) Steam and Power Conversion Systems, Feedwater System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG- 1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Flow-Accelerated Corrosion Program**	VIII.D1.1-a	**3.4.1-6**	**A**
VIII.D1.1.1					**Water Chemistry Control Program** **One Time Inspection Program**	VIII.D1.1-c	**3.4.1-2**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21**
			Outside	None	None Required			**21**
		Stainless Steel	Treated Water	Cracking And Loss of Material	**Water Chemistry Control Program**			**F**
			Outside	None	None Required			**F**

Table 3.4.2-2 (cont'd) Steam and Power Conversion Systems, Feedwater System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG- 1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Flow-Accelerated Corrosion Program**	VIII.D1.2-a	**3.4.1-6**	**A**
VIII.D1.2.1					**Water Chemistry Control Program** **One Time Inspection Program**	VIII.D1.2-b	**3.4.1-2**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21**
			Outside	None	None Required			**21**
		Stainless Steel	Treated Water	Cracking And Loss of Material	**Water Chemistry Control Program**			**F**
			Outside	None	None Required			**F**

Table 3.4.2-3 Steam and Power Conversion Systems, Steam Generator Blowdown System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VIII.H.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A, 21, 33**
Piping *VIII.F.1.1* *VIII.F.1.2*	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Flow-Accelerated Corrosion Program**	VIII.F.1-a	**3.4.1-6**	**A**
					Water Chemistry Control Program **One-Time Inspection Program**	VIII.F.1-b	**3.4.1-2**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A**
		Stainless Steel	Treated Water	Cracking And Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.4.2-3 (cont'd) Steam and Power Conversion Systems, Steam Generator Blowdown System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Flow-Accelerated Corrosion Program**	VIII.F.2-a	**3.4.1-6**	**A**
VIII.F.2.1					**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.F.2-b	**3.4.1-2**	**A**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**A**
		Stainless Steel	Treated Water	Cracking and Loss of Material	**Water Chemistry Control Program**			**F**
			Inside	None	None Required			**F**

Table 3.4.2-4 Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting *VIII.H.2*	Pressure Boundary	Alloy Steel and Carbon Steel	Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A, 33**
Filters (casing)	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
Flow Orifice/Element	Flow Restriction	Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**	VIII.E.5-b	**3.4.1-2**	**D**
	Pressure Boundary		Inside and Outside	None	None Required			**J**
Oil Cooler (shell) *VIII.G.5.1*	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required	VIII.G.5-d	**3.4.1-4**	**G, 23**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**

Table 3.4.2-4 (cont'd) Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Oil Cooler (channel head)	Pressure Boundary	Stainless Steel	Treated Water	Loss of Material and Fouling	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.E.5-b	**3.4.1-2**	**C, 22, 24**
			Inside	None	None Required			**J**
Oil Cooler (tube sheet) *VIII.G.5.3*	Pressure Boundary	Stainless Steel	Lube Oil	None	None Required			**G**
			Treated Water	Loss of Material and Fouling	**Water Chemistry Control Program** **One-Time Inspection Program**			**G, 22, 23**
Oil Cooler (tubes) *VIII.G.5.2*	Exchange Heat Pressure Boundary	Stainless Steel	Lube Oil	Fouling	**One-Time Inspection Program**	VIII.G.5-d	**3.4.1-4**	**H**
			Treated Water	Fouling	**One-Time Inspection Program** **Water Chemistry Control Program**			**G, 22**
				Loss of Material	**Water Chemistry Control Program**	VIII.E.5-b	**3.4.1-2**	**D**

Table 3.4.2-4 (cont'd) Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Piping	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**J, 23**
VIII.G.1.1			Raw Water	Loss of Material and Fouling	**Service Water Program**	VIII.G.1-d	**3.4.1-3**	**A**
			Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.G.1-c	**3.4.1-2**	**A, 22**
			Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
		Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**	VIII.E.5-b	**3.4.1-2**	**D**
			Inside and Outside	None	None Required			**J**

Table 3.4.2-4 (cont'd) Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Pump Casings *VIII.G.2.1*	Pressure Boundary	Alloy Steel (AFW Pump)	Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.G.2-a	**3.4.1-2**	**A, 22**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
		Carbon Steel (lube oil pump)	Lube Oil	None	None Required			**J**
			Inside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
Condensate Storage Tanks *VIII.G.4.1*	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.G.4-a	**3.4.1-2**	**A, 22**
			Outside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**

Table 3.4.2-4 (cont'd) Steam and Power Conversion Systems, Auxiliary Feedwater System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Valve Bodies	Pressure Boundary	Carbon Steel	Lube Oil	None	None Required			**G, 23**
VIII.G.3.1			Treated Water	Loss of Material	**One-Time Inspection Program** **Water Chemistry Control Program**	VIII.G.3-a	**3.4.1-2**	**A, 22**
			Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**	VIII.H.1-b	**3.4.1-5**	**A**
		Stainless Steel	Treated Water	Loss of Material	**Water Chemistry Control Program**	VIII.E.5-b	**3.4.1-2**	**D**
			Inside	None	None Required			**J**

Table 3.4.2-5 Steam and Power Conversion Systems, Auxiliary Steam and Condensate Recovery System – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Closure Bolting	Pressure Boundary	Alloy Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**C, 33**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**C, 33**

Table 3.4.2-5 (cont'd) Steam and Power Conversion Systems, Auxiliary Steam and Condensate Recovery System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping	Pressure Boundary	Carbon Steel	Treated Water (and Steam)	Loss of Material	**Flow Accelerated Corrosion Program**	VIII.E.1-a	**3.4.1-6**	**D**
					Water Chemistry Control Program **One-Time Inspection Program**	VIII.E.1-b	**3.4.1-2**	**D**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**C**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**C**
		Stainless Steel	Treated Water (and Steam)	Cracking	**Water Chemistry Control Program**			**J**
				Loss of Material	**Water Chemistry Control Program**			**J**
			Inside	None	None Required			**J**

Table 3.4.2-5 (cont'd) Steam and Power Conversion Systems, Auxiliary Steam and Condensate Recovery System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Pump Casings	Pressure Boundary	Cast Iron	Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**			**J**
Strainers (shell)	Pressure Boundary	Carbon Steel	Treated Water	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**	VIII.E.1-b	**3.4.1-2**	**D**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**C**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**C**

Table 3.4.2-5 (cont'd) Steam and Power Conversion Systems, Auxiliary Steam and Condensate Recovery System – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Tanks	Pressure Boundary	Carbon Steel	Treated Water (and Steam)	Loss of Material	**Water Chemistry Control Program** **One-Time Inspection Program**			**J**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**C**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**C**
Valve Bodies	Pressure Boundary	Carbon Steel	Treated Water (and Steam)	Loss of Material	**Flow Accelerated Corrosion Program**	VIII.E.2-a	**3.4.1-6**	**D**
					Water Chemistry Control Program **One-Time Inspection Program**	VIII.E.2-b	**3.4.1-2**	**D**
			Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	VIII.H.1-a	**3.4.1-13**	**C**
					External Surfaces Monitoring Program	VIII.H.1-b	**3.4.1-5**	**C**

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

21. With the exception of boric acid corrosion, external surfaces of carbon and alloy steel components that operate at high temperature are not susceptible to loss of material.

22. The OTI Program inspections are focused on AFW system components where stagnant flow conditions and fewer chemistry controls result in an increased potential for corrosion.

23. FNP lube oil systems are not considered to be subject to water contamination. Operating history supports this conclusion.

24. Component not in NUREG-1801. Aging effect requiring management in NUREG-1801 for this material and environment combination is not in NUREG-1801.

33. The FNP process addresses bolting as a commodity regardless of the component type with which the bolting is associated.

40. Loss of material due to flow accelerated corrosion (FAC) is not an aging effect requiring management for those portions of the system with high quality steam.

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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 3.5.2-1** through **3.5.2-9.** The following systems and structures are addressed in this system group (with the applicable Section 2 reference in parentheses):

- PWR Concrete Containment (**Section 2.4.1**)
- Auxiliary Building (**Section 2.4.2.1**)
- Diesel Generator Building (**Section 2.4.2.2**)
- Turbine Building (**Section 2.4.2.3**)
- Utility/Piping Tunnels (**Section 2.4.2.4**)
- Water Control Structures (**Section 2.4.2.5**)
- Steel Tank Structures (Foundations and Retaining Walls) (**Section 2.4.2.6**)
- Yard Structures (**Section 2.4.2.7**)
- Component Supports (**Section 2.4.3**)

Table 3.5.1, Summary of Aging Management Evaluations in Chapter II and III of NUREG-1801 for Structures and Component Supports, provides a summary comparison of the FNP aging management activities with the aging management activities evaluated in NUREG-1801 for the containment, structures and component supports system structures and component groups that are relied on for license renewal. 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 3.0.3**.

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, Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Table 3.5.2-2, Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Table 3.5.2-3, Structures and Component Supports, Diesel Generator Building – Summary of Aging Management Review

Table 3.5.2-4, Structures and Component Supports, Turbine Building – Summary of Aging Management Review

Table 3.5.2-5, Structures and Component Supports, Utility/Piping Tunnels – Summary of Aging Management Review

Table 3.5.2-6, Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Table 3.5.2-7, Structures and Component Supports, Steel Tank Structures (Foundations and Retaining Walls) – Summary of Aging Management Review

Table 3.5.2-8, Structures and Component Supports, Yard Structures – Summary of Aging Management Review

Table 3.5.2-9, Structures and Component Supports, Component Supports – 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:

- PWR Concrete Containment (**Section 3.5.2.1.1**)
- Auxiliary Building (**Section 3.5.2.1.2**)
- Diesel Generator Building (**Section 3.5.2.1.3**)
- Turbine Building (**Section 3.5.2.1.4**)
- Utility/Piping Tunnels (**Section 3.5.2.1.5**)
- Water Control Structures (**Section 3.5.2.1.6**)
- Steel Tank Structures (Foundations and Retaining Walls) (**Section 3.5.2.1.7**)
- Yard Structures (**Section 3.5.2.1.8**)
- Component Supports (**Section 3.5.2.1.9**)

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

3.5.2.1.1 PWR Concrete Containments Aging Management Review Results

Materials

The materials of construction for the components of the Containment Structure requiring an aging management review are:

- reinforced concrete
- carbon steel
- stainless steel
- elastomer

Environments

Components of the Containment Structures are exposed to the following environments:

- inside (with the potential for borated water leakage)
- outside
- below grade
- borated water

Aging Effects Requiring Management

The following aging effects associated with the Containment Structure components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Containment Structure components:

- Inservice Inspection Program (**Appendix B.3.1**)
- Water Chemistry Control Program (**Appendix B.3.2**)
- Structural Monitoring Program (**Appendix B.4.3**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.5.2.1.2 Auxiliary Building Aging Management Review Results

Materials

The materials of construction for the components of the Auxiliary Building Structure requiring an aging management review are:

- reinforced concrete
- carbon steel
- stainless steel
- elastomer
- masonry block

Environments

Components of the Auxiliary Building structures are exposed to the following environments:

- inside (with the potential for borated water leakage)
- outside
- below grade
- borated water

Aging Effects Requiring Management

The following aging effects associated with the Auxiliary Building structure components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Auxiliary Building Structure components:

- Structural Monitoring Program (**Appendix B.4.3**)
- Water Chemistry Control Program (**Appendix B.3.2**)
- Fire Protection Program (**Appendix B.4.5**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.5.2.1.3 Diesel Generator Building Aging Management Review Results

Materials

The materials of construction for the components of the Diesel Generator Building Structure requiring an aging management review are:

- reinforced concrete
- carbon steel
- elastomer
- fiber, foams, and ceramics
- masonry block

Environments

Components of the Diesel Generator Building structures are exposed to the following environments:

- inside
- outside
- below grade

Aging Effects Requiring Management

The following aging effects associated with the Diesel Generator Building structure components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Diesel Generator Building Structure components:

- Structural Monitoring Program (**Appendix B.4.3**)
- Fire Protection Program (**Appendix B.4.5**)

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 an aging management review are:

- reinforced concrete
- carbon steel

Environments

Components of the Turbine Building structures are exposed to the following environments:

- inside
- outside
- below grade

Aging Effects Requiring Management

The following aging effects associated with the Turbine Building structure components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Turbine Building Structure components:

- Structural Monitoring Program (**Appendix B.4.3**)

3.5.2.1.5 Utility/Piping Tunnels Aging Management Review Results

Materials

The materials of construction for the components of the Utility/Piping Tunnel Structures requiring an aging management review are:

- reinforced concrete
- carbon steel
- elastomer

Environments

Components of the Utility/Piping Tunnel structures are exposed to the following environments:

- outside
- buried
- embedded

Aging Effects Requiring Management

The following aging effects associated with the Utility/Piping Tunnel structure components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Utility/Piping Tunnel Structure components:

- Structural Monitoring Program (**Appendix B.4.3**)

3.5.2.1.6 Water Control Structures Aging Management Review Results

Materials

The materials of construction for the components of the Water Control Structures requiring an aging management review are:

- reinforced concrete
- carbon Steel
- stainless steel
- elastomer
- dam and embankment Material (earthen structures)
- masonry block

Environments

Components of the Water Control Structures are exposed to the following environments:

- inside
- outside
- below grade
- raw water

Aging Effects Requiring Management

The following aging effects associated with the Water Control Structures components require management:

- loss of material
- cracking
- change in material properties
- loss of form

Aging Management Programs

The following programs manage the aging effects requiring management for the Water Control Structures components:

- Structural Monitoring Program (**Appendix B.4.3**)
- Service Water Pond Dam Inspection (**Appendix B.3.3**)
- Fire Protection Program (**Appendix B.4.5**)

3.5.2.1.7 Steel Tank Structures (Foundations and Retaining Walls) Aging Management Review Results

Materials

The materials of construction for the components of the Steel Tank Structures requiring an aging management review are:

- reinforced concrete
- carbon steel

Environments

Components of the Steel Tank Structures are exposed to the following environments:

- outside
- below grade

Aging Effects Requiring Management

The following aging effects associated with the Steel Tank Structures components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Steel Tank Structures components:

- Structural Monitoring Program (**Appendix B.4.3**)

3.5.2.1.8 Yard Structures Aging Management Review Results

Materials

The materials of construction for the components of the Yard Structures requiring an aging management review are:

- reinforced concrete
- carbon steel
- masonry block

Environments

Components of the Yard Structures are exposed to the following environments:

- inside
- outside
- below grade

Aging Effects Requiring Management

The following aging effects associated with the Yard Structures components require management:

- loss of material
- cracking
- change in material properties

Aging Management Programs

The following programs manage the aging effects requiring management for the Yard Structures components:

- Structural Monitoring Program (**Appendix B.4.3**)
- Fire Protection Program (**Appendix B.4.5**)

3.5.2.1.9 Component Supports Aging Management Review Results

Materials

The materials of construction for the components of the Component Supports requiring an aging management review are:

- aluminum
- carbon steel
- stainless steel

Environments

Components of the Component Supports are exposed to the following environments:

- inside (with the potential for borated water leakage)
- outside

Aging Effects Requiring Management

The following aging effects associated with the Component Supports components require management:

- loss of material

Aging Management Programs

The following programs manage the aging effects requiring management for the Component Supports components:

- Structural Monitoring Program (**Appendix B.4.3**)
- Inservice Inspection Program (**Appendix B.3.1**)
- Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**)

3.5.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Structures and Component Supports

NUREG-1801 identifies those component, material, environment, aging effect, and aging management program combinations evaluated in NUREG-1801 that warrant further evaluation in a license renewal application. NUREG-1800 (Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants) outlines the specific issues requiring further evaluation. For structures and component supports, those programs are addressed in the following sections.

3.5.2.2.1 Aging of Inaccessible Concrete Areas

The aging mechanisms associated with leaching of calcium hydroxide and corrosion of embedded steel are potentially applicable to below- grade concrete structures owing to plant operating experience and NRC position stated in ISG-03. Aggressive Chemical Attack is not a possible aging mechanism at FNP because concrete is not exposed to an aggressive environment.

Leaching of Calcium Hydroxide

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 FNP containment structure is not exposed to flowing water and is designed in accordance with ACI 318 and constructed in accordance with ACI 301 and ASTM Standards, which provides a good quality, dense, low permeability concrete. Noticeable leaching has been identified in the accessible containment Tendon Access Gallery (due to groundwater infiltration) and minor leaching in below grade concrete in other structures. Leaching is managed by the following programs: 10 CFR 50 Appendix J General Visual Inspection, Containment ISI Program (IWL), and Structural Monitoring Program (SMP).

The Structural Monitoring Program for FNP has been enhanced to apply a special inspection provision for monitoring aging effects below grade. This involves inspecting the condition of below grade concrete that is exposed during excavation. These aging management activities are consistent with the GALL Report.

Aggressive Chemical Attack

Aggressive chemical attack becomes significant to concrete exposed to an aggressive environment (Chlorides > 500 ppm, Sulfates >1500 ppm, and pH < 5.5). Resistance to mild acid attack is enhanced by using a dense concrete with low permeability and a low water to cement ratio of less than 0.50. The FNP 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. FNP is not located in areas exposed to sulfate or chloride attack, nor is it located near industrial plants whose emissions would change environmental parameters and cause degradation to concrete. The water chemical analysis results confirm that the site ground-water is non-aggressive. Historical results are presented in **FNP UFSAR Table 2.4-7**. Results from sample testing performed this year (2003) are: pH values between 6.68 and 7.14, chloride values between 2.00 and 3.74 ppm, and sulfate values between 5.25 ppm and 6.37 ppm. Therefore, loss of material due to aggressive chemical attack is not an aging effect requiring management for FNP concrete structures above or below grade.

Corrosion of Embedded Steel

Corrosion of Embedded Steel becomes significant if exposed to an aggressive environment (Ph < 11. 5 and chlorides > 500 ppm). 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 FNP concrete structure (in accordance with accepted ACI Standards) prevents corrosion of embedded steel from occurring. Minor corrosion of embedded steel has been observed in few places at different concrete structures. Corrosion of embedded steel is managed by the following programs: 10 CFR 50 Appendix J General Visual Inspection, Containment ISI Program (IWL), and Structural Monitoring Program (SMP).

Inaccessible Areas

Inaccessible Areas at FNP do not require a plant- specific aging management program for leaching of calcium hydroxide, aggressive chemical attack or corrosion of embedded steel due to the following:

- Containment concrete surfaces are not exposed to flowing water and the in- place concrete is constructed to design requirements in accordance with ACI recommendations (at the time of construction) which produced a dense concrete with low permeability. Specific reference to ACI 201.2R- 77 is not made since the plant was designed and constructed prior to 1977.

- Concrete is not exposed to a below grade environment which is considered aggressive. Refer above to "Aggressive Chemical Attack" for "Accessible Areas." Additionally, FNP 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.

- The Structural Monitoring Program for FNP has been enhanced to apply a special inspection provision for monitoring aging effects below grade. This involves inspecting the condition of below grade concrete that is exposed during excavation.

3.5.2.2.2 <u>Cracking, Distortion, and Increases in Component Stress Level due to Settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structural Monitoring Program</u>

Settlement and erosion of porous concrete sub-foundations is not applicable to FNP. FNP structures are typically founded on bedrock, or consolidated backfill.

Settlement is not an aging mechanism for FNP because of the following:

- The FNP containment foundation is constructed directly on bedrock (Lisbon formation) and is not subject to settlement.

- Settlement of the structures was monitored, and no indication of settlement has been detected (Refer **FNP UFSAR Section 2B.7.3.1**).

- FNP does not rely on a de-watering system to lower the site ground water level.

Reduction of foundation strength due to erosion of porous concrete sub-foundations is not applicable to FNP. The concrete foundations at FNP are not constructed of porous concrete and are not subject to flowing water.

3.5.2.2.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

During normal plant operation, solar heat load and equipment heat loads contribute to an increase in temperature of the internal environment of the concrete structures. Surface scaling and cracking may result from long term exposure to high temperatures.

ACI 318 provides a maximum temperature limit of 150^{O} F for liquid, gas, or vapor in embedded piping in structural concrete. ASME Code Section III, Division 2 and ACI-349 provide limits where exposure to high temperatures could impair the concrete. ASME Code, Section III, Division 2, Subsection CC indicates that aging due to elevated temperature exposure is not significant as long as concrete temperatures do not exceed $150\ ^{O}$ F, except for local areas surrounding penetrations which are allowed to have increased temperatures not exceeding 200^{O} F ACI 349 allows local area temperatures to reach 200^{O} F before special provisions are required. Higher temperatures than given may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and this reduction is applied to the design allowable.

Temperatures for most locations throughout FNP are well below the 150^{O} F threshold. Several local areas within the containment structure experience temperatures approaching and exceeding 150^{O} F.

In 1997, SNC approved a change to the UFSAR to increase the allowable reactor vessel concrete support temperature from 130^{O} F to 190^{O} F. NRC raised a concern about exceeding the 150^{O}F limit. However, recognizing the potential degradation of the Reactor Pressure Vessel supports (RPVS) subjected to sustained temperatures higher than 150^{O} F, FNP has committed (NEL Letter #00-279 to USNRC) to inspect the structural components including portions of the RPVS in the containment building as part of the maintenance rule structural monitoring program. This program will ensure that significant cracking of RPVS that could affect the structural support of the reactor vessel or cause out of plumbness conditions will be detected and corrected. Though, in general, FNP concrete structures and components are not exposed to temperatures which exceed the threshold for degradation, it is still wise to manage the concrete because of possible isolated occurrences. Therefore, change in material properties due to elevated temperature has been recognized as an aging effect requiring management for concrete structures and components inside containment only. Structural Monitoring Program for FNP has been enhanced to include inspection requirements for containment internal concrete for monitoring aging effects due to elevated temperature.

3.5.2.2.4 Loss of Material due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate

Corrosion for inaccessible areas (embedded containment liner) is not significant because:

- Concrete meeting the requirements of ACI 318 or ACI 349 and the guidance of ACI 201.2R was used for the containment concrete in contact with the embedded containment liner.
- The concrete is monitored under the Maintenance Rule Structural Monitoring Program and IWL to ensure that it is free of penetrating cracks.
- The moisture barrier is monitored under IWE for aging degradation.
- Borated water leakage in the containment structure is not a common occurrence and is monitored under the aging management program Borated Water Leakage Assessment and Evaluation Program.

FNP uses 10CFR 50 Appendix J General Visual Inspection, 10 CFR 50 Appendix J Leak Rate Testing, Containment ISI Program - IWE/ IWL and Borated Water Leakage Assessment and Evaluation Programs to manage corrosion in accessible and inaccessible areas. Aging management for this component/commodity group is consistent with those reviewed and approved in NUREG-1801.

3.5.2.2.5 Loss of Prestress due to Relaxation, Shrinkage, Creep, and Elevated Temperature

The FNP Containment cylindrical wall is post-tensioned in both vertical and hoop directions. The hoop tendons are placed in three 240 degree segments using three vertical buttresses spaced 120 degrees apart. The dome tendons are anchored at the sides of the ring girder. The tendon and anchors are also encapsulated by gasketed end caps which are filled with a corrosion protection material and sealed against the bearing plates.

The Nuclear Regulatory Commission (NRC) issued Information Notice (IN) 99-10 to alert addressees of degradation to prestressing system components of prestressed concrete containments.

The specific issues addressed by the IN are (1) prestressing tendon wire breakage, (2) the effects of high temperature on the prestressing forces in tendons, and (3) trend analysis of prestressing forces. Item 1 deals with factors that may cause tendon wire breakage. FNP's tendon surveillance procedure currently addresses all the issues related to wire breakage. Item 2 concerns the effects of high ambient temperature on the relaxation forces of the tendon wires. FNP accounts for relaxation forces in predicting the required tendon forces. No concerns have been indicated in previous surveillances with high temperature effects. Item 3 concerns using linear regression analysis and actual lift-off forces for trending of prestressing forces. FNP has not used linear regression for trending of tendon force data. Past surveillances do not indicate any trend for tendon forces to fall below the minimum required prestress. To indicate the trend is within the required prestress limits, a graph of the trend using regression methods was prepared. The trend indicated by these graphs and previous evaluations shows that FNP tendons are performing as expected.

Aging management of concrete containment tendon prestress is managed by the Containment Inservice Inspection Program (ASME Section XI Subsection IWL Category L-B / Tendon Surveillance Program). This program provides reasonable assurances that the aging effects for the tendons will be managed so that their intended functions will be maintained consistent with the CLB for the period of extended operation.

3.5.2.2.6 Cumulative Fatigue Damage

Fatigue analyses are not included in current licensing basis for the containment liner plate and penetrations. Therefore this item does not qualify as a TLAA as defined in 10 CFR 54.3.

3.5.2.2.7 Cracking due to Cyclic Loading and SCC

SCC is not an applicable aging mechanism for sleeves/bellows. The FNP AMR requires both high temperature and exposure to an aggressive environment for SCC to be applicable. Also, SCC is not applicable to carbon steel. Based on FNP experience with SCC, additional methods of detecting aging effects are not warranted.

Penetration sleeves and bellows are considered part of the IWE pressure boundary, and both the ASME Section XI, Subsection IWE Program, and the 10 CFR Part 50, Appendix J Program are applicable.

Management of cracking for this component/ commodity group is consistent with the GALL Report.

3.5.2.2.8 Aging of Structures Not Covered by Structural Monitoring Program

NUREG-1801 recommends further evaluation of certain structure/aging effect combinations if they are not covered by the structural monitoring program. All FNP in-scope structures are managed by the Inservice Inspection Program and Structural Monitoring Program. All the aging effects (e.g. cracking, loss of material, change in material properties) are identified by these programs irrespective of the mechanisms which caused it. Due to the type of construction and design, geographic location and below grade water chemistry of FNP, it has been determined that the only aging mechanisms applicable to concrete structures are: corrosion of embedded steel, leaching of calcium hydroxide and elevated temperature. Based on the same logic, aging mechanisms applicable to steel elements are different types of localized corrosions. See Sections **3.5.2.2.1**, **3.5.2.2.2**, **3.5.2.2.3**, **3.5.2.2.4**, **3.5.2.2.5** for details.

3.5.2.2.9 Aging Management of Inaccessible Areas

See **Section 3.5.2.2.1** for details.

3.5.2.2.10 Aging of Supports Not Covered by Structural Monitoring Program

NUREG-1801 recommends further evaluation of certain component support/aging effect combinations if they are not covered by the structural monitoring program. The FNP Structural Monitoring Program is applicable to all components in Groups B2–B5. Group B1 component supports are managed by Inservice Inspection Program (IWF).

3.5.2.2.11 Cumulative Fatigue Damage

Fatigue analyses are not included in current licensing basis for the support members, anchor bolts, welds, etc. Generally, steel components are not prone to fatigue. Loads for the most part, are applied gradually and remain constant. Members subjected to fatigue loading conditions are accounted for by code in their design. Therefore this item does not qualify as a TLAA as defined in 10 CFR 54.3.

3.5.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with the Containment systems components.

- Loss of Prestress (**Section 4.3.4**)

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
Common Components of ALL Types of PWR and BWR Containment					
3.5.1-1	Penetration sleeves, penetration bellows, and dissimilar metal welds	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	This summary item is not applicable to FNP. See **Section 3.5.2.2.6** for further discussion.
3.5.1-2	Penetration sleeves, bellows, and dissimilar metal welds.	Cracking due to cyclic loading, or crack initiation and growth due to SCC	Containment inservice inspection (ISI) and containment leak rate test	Yes, detection of aging effects is to be evaluated	This summary item is not applicable to FNP. See **Section 3.5.2.2.7** for further discussion.
3.5.1-3	Penetration sleeves, penetration bellows, and dissimilar metal welds	Loss of material due to corrosion	Containment ISI and containment leak rate test	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Inservice Inspection Program (**Appendix B.3.1**) will manage this aging effect.
3.5.1-4	Personnel airlock and equipment hatch	Loss of material due to corrosion	Containment ISI and containment leak rate test	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Inservice Inspection Program (**Appendix B.3.1**) will manage this aging effect.

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
3.5.1-5	Personnel airlock and equipment hatch	Loss of leak tightness in closed position due to mechanical wear of locks, hinges and closure mechanisms	Containment leak rate test and Plant Technical Specifications	No	The FNP Inservice Inspection Program (Includes Leak Rate Test) (**Appendix B.3.1**) will manage any loss of leak tightness. Loss of material due to 'wear' has not been identified at FNP. Operation of hatches is governed by FNP Technical Specifications. Plant operational experience has not identified any fretting or seal degradation. Locks, hinges, and closure mechanisms are active components. Therefore, mechanical wear is not considered as credible aging mechanism causing an aging effect requiring management.
3.5.1-6	Seals, gaskets, and moisture barriers	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and containment leak rate test	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Inservice Inspection Program (Includes Leak Rate Test) (**Appendix B.3.1**) for pressure boundary items, Structural Monitoring Program for non pressure boundary items (**Appendix B.4.3**) will manage this aging effect.

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
PWR Concrete (Reinforced and Prestressed) and Steel Containment **BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment**					
3.5.1-7	Concrete elements: foundation, dome, and wall	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI	Yes, a plant specific aging management program is required for inaccessible areas as stated	The FNP Inservice Inspection Program (**Appendix B.3.1**) will manage accessible and inaccessible concrete due to leaching of calcium hydroxide and corrosion of embedded steel. Aggressive chemical attack is not an applicable aging effect requiring management for FNP. See **Section 3.5.2.2.1** for further discussion.
3.5.1-8	Concrete Elements: foundation	Cracks, distortion, and increases in component stress level due to settlement	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	Settlement is not an aging mechanism for FNP. See **Section 3.5.2.2.2** for further details.
3.5.1-9	Concrete elements: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	This summary item is not applicable to FNP. See **Section 3.5.2.2.2** for further details.
3.5.1-10	Concrete elements: foundation, dome, and wall	Reduction of strength and modulus due to elevated temperature	Plant specific	Yes, for any portions of concrete containment that exceed specified temperature limits	This summary item is consistent with NUREG-1801 for the area of concrete that exceed specified temperature limits. See **Section 3.5.2.2.3** 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
3.5.1-11	Prestressed containment: tendons and anchorage components	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	The FNP AMR results are consistent with this summary item. See **Section 3.5.2.2.5** for further discussion and **Section 4.3.3** for TLAA evaluation.
3.5.1-12	Steel elements: liner plate, containment shell	Loss of material due to corrosion in accessible and inaccessible areas	Containment 151 and containment leak rate test	Yes, if corrosion is significant for inaccessible areas	The FNP AMR results are consistent with this summary item. See **Section 3.5.2.2.4** for further discussion.
3.5.1-13	BWR Only				
3.5.1-14	Steel elements: protected by coating	Loss of material due to corrosion in accessible areas only	Protective coating monitoring and maintenance	No	This summary item is not applicable to FNP. Protective coatings are not credited for aging management. Loss of material is managed by FNP Inservice Inspection Program (**Appendix B.3.1**).
3.5.1-15	Prestressed containment: tendons and anchorage components	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Inservice Inspection Program (**Appendix B.3.1**) will manage this aging effect.

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
3.5.1-16	Concrete elements: foundation, dome, and wall	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI	No, if stated conditions are satisfied for inaccessible areas	This summary item is not applicable to FNP. **Freeze-thaw** is not an aging mechanism requiring management for the containment structure at FNP based on the following: • As per ASTM C33 FNP is located very close to region of negligible weathering conditions. • It is not exposed to saturated water conditions • Concrete is designed and constructed to acceptable ACI and ASTM Standards. **Reaction with Aggregates** is not an aging mechanism requiring management for the containment structure at FNP based on the following: • Nonreactive aggregates were used at FNP. Aggregates were subjected to petrographic testing in accordance with ASTM C-295-65 and C-89-66 to show that the aggregate is nonreactive. • The concrete aggregates used are from local quarries.

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
3.5.1-16 (cont'd)					• Operating history does not indicate that structure is significantly affected by alkali-aggregate reactions.
3.5.1-17	BWR Only				
3.5.1-18	BWR Only				
3.5.1-19	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
Class I Structures					
3.5.1-20	All Groups except Group 6: accessible interior/ exterior concrete and steel components	All types of aging effects	Structures monitoring	No, if within the scope of the applicant's structures monitoring program and a plant-specific aging management program is required for inaccessible areas as stated	All FNP structure components applicable to this summary item will be monitored by the Structural Monitoring Program (**Appendix B.4.3**). **Concrete:** The FNP AMR methodology concluded that above grade concrete structures have following aging effects requiring management: • Cracking, loss of bond, and loss of material due to corrosion of embedded steel. • Change in material properties due to leaching of calcium hydroxide. **Structural Steel**: In addition to the Structures Monitoring Program, the Borated Water Leakage Assessment and Evaluation Program is applicable for corrosion caused by leakage of borated water onto carbon steel components of this component/ commodity group. Protective coatings are not credited for aging management of steel components, See **Section 3.5.2.2** 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
3.5.1-21	Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant specific	Yes, a plant specific aging management program is required for inaccessible areas as stated	The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage accessible and inaccessible concrete due to corrosion of embedded steel. Aggressive chemical attack is not an applicable aging effect requiring management for FNP. See **Section 3.5.2.2** for further discussion.
3.5.1-22	Group 6: all accessible/ inaccessible concrete, steel, and earthen components	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of water-control structures or FERC/US Army Corps of Engineers dam inspection and maintenance	No	The Service Water Pond Dam Inspection Program (**Appendix B.3.3**) and Structural Monitoring Program (**Appendix B.4.3**) are applied to components/ commodities in this group that have aging effects. **Concrete:** The FNP AMR methodology concluded that above grade concrete structures have following aging effects requiring management: • Cracking, loss of bond, and loss of material due to corrosion of embedded steel. • Change in material properties due to leaching of calcium hydroxide. • Loss of Material Due to Abrasion.

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
3.5.1-22 (cont'd)					See **Section 3.5.2.2** for further discussion. **<u>Structural Steel</u>**: The FNP AMR results are consistent with NUREG-1801 except for the AMP. The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage the loss of material due to corrosion. Protective coatings are not credited for aging management of steel components. **<u>Earthen Structure</u>**: The FNP AMR Results are consistent with NUREG-1801. FNP pond dam/dike is an earthen structure with water control components fabricated of concrete and steel. FNP applies the Service Water Pond Dam Inspection Program (**Appendix B.3.3**) which meets Regulatory Guide 1.127.

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
3.5.1-23	Group 5: liners	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Water chemistry and monitoring of spent fuel pool water level	No	The FNP AMR Results are consistent with NUREG-1801 with some minor exceptions. Loss of material due to localized corrosion will be managed by FNP Water Chemistry Control Program (**Appendix B.3.2**). SCC is not applicable for reactor cavity or spent fuel pool liners because it is not subjected to high temperatures and an aggressive environment.
3.5.1-24	Groups 1-3, 5, 6: all masonry block walls	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry wall	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage the cracking of masonry wall.
3.5.1-25	Groups 1-3, 5, 7-9: foundation	Cracks, distortion, and increases in component stress level due to settlement	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	This summary item is not applicable to FNP. Settlement is not an aging mechanism for FNP. See **Section 3.5.2.2.2** for further details.
3.5.1-26	Groups 1-3, 5-9: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	This summary item is not applicable to FNP. See **Section 3.5.2.2.2** 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
3.5.1-27	Groups 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant specific	Yes, for any portions of concrete that exceed specified temperature limits	This summary item is not applicable to FNP. Concrete for Group 3, 4 and 5 structures do not exceed the specified temperature limits. See **Section 3.5.2.2.3** for further discussion.
3.5.1-28	Groups 7, 8: liners	Crack Initiation and growth due to SCC; Loss of material due to crevice corrosion	Plant specific	Yes	This summary item is not applicable to FNP. Group 7 (Concrete Tanks) are not used at FNP. Group 8 (Steel Tanks) are addressed as part of mechanical process system.

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
Component Supports					
3.5.1-29	All Groups: support members: anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc.	Aging of component supports	Structures monitoring	No, if within the scope of the applicant's structures monitoring program	The FNP AMR Results are consistent with NUREG-1801. The FNP Structural Monitoring Program (**Appendix B.4.3**) will manage the associated aging effects of all components in this summary item.
3.5.1-30	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	This summary item is not applicable to FNP. See **Section 3.5.2.2.11** for further discussion.
3.5.1-31	All Groups: support members: anchor bolts, welds	Loss of material due to boric acid corrosion	Boric acid corrosion	No	The FNP AMR Results are consistent with NUREG-1801. The FNP Borated Water Leakage Assessment and Evaluation Program (**Appendix B.3.5**) will manage this aging effect.

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 B1.1, B1.2, and B1.3: support members: anchor bolts, welds, spring hangers, guides, stops, and vibration isolators	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI	No	The FNP AMR Results are consistent with NUREG-1801 with minor exceptions. The FNP Structural Monitoring Program (**Appendix B.4.3**) and FNP Inservice Inspection Program (**Appendix B.3.1**) will manage this aging effect. FNP does not consider loss of mechanical function to be an aging effect requiring management based on the plant operating experience.
3.5.1-33	Group B1.1: high strength low-alloy bolts	Crack initiation and growth due to SCC	Bolting integrity	No	This summary item is not applicable to FNP. The FNP AMR determined that SCC is not an applicable aging mechanism for FNP bolting. The FNP position is that bolts with a specified minimum yield strength ≥150 ksi are susceptible to SCC under expected environmental conditions. Review of FNP operating experience did not identify any instances of SCC.

Table 3.5.2-1 Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete Elements: Above Grade - Dome; wall; ring girder; buttresses *II.A1.1*	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Shelter / Protection Structural Support Radiation Shielding	Concrete - Reinforced	Inside and Outside	Cracking and Loss of Material	**Inservice Inspection Program**	II.A1.1-e	**3.5.1-7**	**A, 54**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete Elements: Below Grade - wall; buttresses *II.A1.1*	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Radiation Shielding Structural Support Shelter / Protection	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Inservice Inspection Program**	II.A1.1-b	**3.5.1-7**	**A, 53**
						II.A1.1-e	**3.5.1-7**	**A, 54**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete Elements: Foundation; subfoundation *II.A1.1*	Fire Barrier Heat Sink Missile Barrier NSR Structural Support Radiation Shielding Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Inservice Inspection Program**	II.A1.1-b	**3.5.1-7**	**A, 53**
						II.A1.1-e	**3.5.1-7**	**A, 54**

Table 3.5.2-1 (cont'd) *Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review*

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Internal Structures *III.A4.1*	Heat Sink Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Inside	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A4.1-c	**3.5.1-27**	**A, 47**
						III.A4.1-d	**3.5.1-20**	**A, 54**
Fuel Transfer Tube	Shelter / Protection Structural Support	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**	III.A5.2-b	**3.5.1-23**	**D, 30**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Internal Structure: Steel Liners *III.A5.2*	Fission Product Barrier Pressure Boundary Radiation Shielding Shelter / Protection Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.A4.2-a	**3.5.1-20**	**C, 46**
						III.B1.1.1-b	**3.5.1-31**	**C**
		Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**	III.A5.2-b	**3.5.1-23**	**A, 30**
Penetration Sleeves, Penetration bellows *II.A3.1*	Fission Product Barrier Pressure Boundary Structural Support	Carbon Steel	Inside	Loss of Material	**Inservice Inspection Program**	II.A3.1-a	**3.5.1-3**	**A**
		Stainless Steel	Inside	None	None Required	II.A3.1-c II.A3.1-d	**3.5.1-2**	**I**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Personnel Airlock and Equipment Hatch *II.A3.2*	Missile Barrier Radiation Shielding Pressure Boundary Fission Product Barrier Fire Barrier	Carbon Steel	Inside	Loss of Material	**Inservice Inspection Program**	II.A3.2-a	**3.5.1-4**	**A**
Prestressing System: Tendons; Anchorage Components *II.A1.3*	Structural Support	Carbon Steel	Outside	Cracking and Loss of Material	**Inservice Inspection Program**	II.A1.3-a	**3.5.1-15**	**H**
						II.A1.3-a	**3.5.1-15**	**A**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Seals, Gaskets and Moisture Barriers *II.A3.3*	Fission Product Barrier Radiation Shielding	Elastomers	Inside	Change in Material Properties and Cracking	**Inservice Inspection Program**	II.A3.3-a	**3.5.1-6**	**A, 47**
					Structural Monitoring Program	II.A3.3-a	**3.5.1-6**	**E, 47**
Steel Components: All structural steel *III.A4.2*	NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B1.1. 1-b	**3.5.1-31**	**C, 46**
					Structural Monitoring Program	III.A4.2-a	**3.5.1-20**	**A**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Steel Components: Refuel Cavity & Transfer Canal Misc. Steel	HE/ME Shielding NSR Structural Support Pipe whip Restraint Shelter / Protection Structural Support	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**	III.A5.2-b	**3.5.1-23**	**C, 30**
Steel elements: Liner; liner anchors; integral attachments *II.A1.2*	Fission Product Barrier Pressure Boundary Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	II.A1.2-a	**3.5.1-12** **3.5.1-14**	**E**
					Inservice Inspection Program	II.A1.2-a	**3.5.1-12** **3.5.1-14**	**A**
Sump Trash Rack	Debris Protection Structural Support	Stainless Steel	Inside	None	None Required			**J**

Table 3.5.2-1 (cont'd) Structures and Component Supports, PWR Concrete Containments – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Tri-Sodium Phosphate Basket	Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B1.1.1-b	**3.5.1-31**	**C, 46**
					Structural Monitoring Program	III.A4.2-a	**3.5.1-20**	**C**

Table 3.5.2-2 Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Compressible Joints and Seals	Shelter / Protection	Elastomers	Inside and Outside	Change in Material Properties and Cracking	**Structural Monitoring Program**			**J**
Concrete: Exterior above grade *III.A3.1* *III.A5.1*	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d III.A5.1-d	**3.5.1-20**	**A, 54**
Concrete: Exterior below grade *III.A3.1* *III.A5.1*	Fire Barrier Shelter / Protection Structural Support NSR Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b III.A5.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-e III.A5.1-e	**3.5.1-21**	**A, 54**

Table 3.5.2-2 (cont'd) Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Foundation *III.A3.1* *III.A5.1*	NSR Structural Support Fire Barrier Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b III.A5.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-e III.A5.1-e	**3.5.1-21**	**A, 54**
Concrete: Interior *III.A3.1* *III.A5.1*	Fire Barrier Flood Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Inside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d III.A5.1-d	**3.5.1-20**	**A, 54**

Table 3.5.2-2 (cont'd) Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Roof slab *III.A3.1* *III.A5.1*	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d III.A5.1-d	**3.5.1-20**	**A, 54**
Non-Fire Doors	Missile Barrier Shelter / Protection	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
Fire Doors *VII.G.3.3*	Fire Barrier Shelter / Protection Structural Support	Carbon Steel	Outside	Loss of Material	**Fire Protection Program**	VII.G.3-d	**3.3.1-20**	**A, 56**
Fire Seals *VII.G.3.1*	Fire Barrier	Elastomers	Inside	Cracking	**Fire Protection Program**	VII.G.3-a	**3.3.1-20**	**A, 47**

Table 3.5.2-2 (cont'd) Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Masonry Walls: All *III.A3.3*	Fire Barrier NSR Structural Support Shelter / Protection Structural Support	Masonry Block	Inside	Cracking	**Structural Monitoring Program**	III.A3.3-a	**3.5.1-24**	**A**
New Fuel Storage Racks: Storage Rack Assembly *VII.A1.1*	NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	VII.A1.1-a	**3.3.1-11**	**A**
		Stainless Steel	Inside	None	None Required			**F**
Penetration Sleeves *III.A3.2*	NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
						III.A3.1-a	**3.5.1-3**	**E**
		Stainless Steel	Outside	None	None Required			**J**

Table 3.5.2-2 (cont'd) Structures and Component Supports, Auxiliary Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Spent Fuel Storage Racks: Storage Racks *VII.A2.1*	NSR Structural Support Shelter / Protection Structural Support	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**	VII.A2.1-c	**3.3.1-13**	**H, 30**
Steel Components: All Structural Steel *III.A3.2* *III.A5.2*	NSR Structural Support Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B1.1.1-b	**3.5.1-31**	**C, 46**
					Structural Monitoring Program	III.A3.2-a III.A5.2-a	**3.5.1-20**	**A**
Steel Components: Liners *III.A5.2*	NSR Structural Support Shelter / Protection Structural Support	Stainless Steel	Borated Water	Loss of Material	**Water Chemistry Control Program**	III.A5.2-b	**3.5.1-23**	**B, 30**

Table 3.5.2-3 Structures and Component Supports, Diesel Generator Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Compressible Joints and Seals	Shelter / Protection	Elastomers	Inside	None	None Required			**J**
		Fibers, Foams, Ceramics	Below Grade	None	None Required			**J**
Concrete: Exterior above grade *III.A3.1*	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Concrete: Foundation *III.A3.1*	NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-e	**3.5.1-21**	**A, 54**

Table 3.5.2-3 (cont'd) Structures and Component Supports, Diesel Generator Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Interior *III.A3.1*	Fire Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Inside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Concrete: Roof slab *III.A3.1*	Fire Barrier Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**

Table 3.5.2-3 (cont'd) Structures and Component Supports, Diesel Generator Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Non-Fire Doors	Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
Fire Doors *VII.G.4.3*	Fire Barrier Shelter / Protection	Carbon Steel	Inside	Loss of Material	**Fire Protection Program**	VII.G.4-d	**3.3.1-20**	**A, 56**
Fire Seals *VII.G.4.1*	Fire Barrier Shelter / Protection	Elastomers	Inside	Cracking	**Fire Protection Program**	VII.G.4-a	**3.3.1-20**	**A, 47**

Table 3.5.2-3 (cont'd) Structures and Component Supports, Diesel Generator Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Masonry Walls: All *III.A3.3*	Fire Barrier NSR Structural Support Shelter/Protection Structural Support	Masonry Block	Inside	Cracking	**Structural Monitoring Program**	III.A3.3-a	**3.5.1-24**	**A**
Penetration Sleeves	NSR Structural Support Shelter/Protection Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
Steel Components: All Structural Steel *III.A3.2*	NSR Structural Support Shelter/Protection Structural Support	Carbon Steel	Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**A**

Table 3.5.2-4 Structures and Component Supports, Turbine Building – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Concrete: Exterior above grade *III.A3.1*	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Concrete: Exterior below grade *III.A3.1*	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-e	**3.5.1-21**	**A, 54**
Concrete: Foundation *III.A3.1*	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-e	**3.5.1-21**	**A, 54**

Table 3.5.2-4 (cont'd) Structures and Component Supports, Turbine Building – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vol. 2 Item**	**Table 1 Item**	**Notes**
Concrete: Interior *III.A3.1*	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Inside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Concrete: Roof slab *III.A3.1*	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Steel Components: All Structural Steel *III.A3.2*	NSR Structural Support Shelter/Protection	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**A**

Table 3.5.2-5 Structures and Component Supports, Utility/Piping Tunnels – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Compressible Joints and Seals	Shelter / Protection	Elastomers	Embedded	None	None Required			**J**
Concrete: Exterior above grade *III.A3.1*	NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**A, 54**
Concrete: Exterior below grade *III.A3.1*	NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Buried	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**A, 53**
						III.A3.1-d	**3.5.1-20**	**A, 54**
Structural Steel *III.A3.2*	NSR Structural Support Structural Support	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**A**

Table 3.5.2-6 Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Volume 2 Item	Table 1 Item	Notes
Concrete: Exterior above grade *III.A6.1*	Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**C, 54**
Concrete: Exterior below grade *III.A6.1*	NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**C, 53**
						III.A3.1-d	**3.5.1-20**	**C, 54**
			Raw Water	Change in Material Properties, Cracking and Loss of Material	**Service Water Pond Dam Inspection Program**	III.A6.1-b	**3.5.1-22**	**A, 53**
						III.A6.1-d	**3.5.1-22**	**A, 54**

Table 3.5.2-6 (cont'd) Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Foundation	NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**C, 53**
						III.A3.1-d	**3.5.1-20**	**C, 54**
Concrete: Interior *III.A6.1*	Fire Barrier Flood Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Inside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**C, 54**

Table 3.5.2-6 (cont'd)   Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Roof slab *III.A6.1*	Missile Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**C, 54**
Non-Fire Doors	Shelter / Protection Structural Support	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
Earthen water-control structures: Dams, embankment *III.A6.4*	Flood Barrier Heat Sink	Dam and Embankment Material	Raw Water	Loss of Form (earthen embank.) and Loss of Material	**Service Water Pond Dam Inspection Program**	III.A6.4-a	**3.5.1-22**	**A**
Fire Doors *VII.G.1.3*	Fire Barrier Shelter / Protection	Carbon Steel	Inside	Loss of Material	**Fire Protection Program**	VII.G.1-d	**3.3.1-20**	**A, 56**

Table 3.5.2-6 (cont'd) Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Fire Seals *VII.G.1.1*	Fire Barrier	Elastomers	Inside	Cracking	**Fire Protection Program**	VII.G.1-a	**3.3.1-20**	**A, 47**
Masonry Walls: All *III.A6.3*	Fire Barrier NSR Structural Support Shelter / Protection Structural Support	Masonry Block	Inside	Cracking	**Structural Monitoring Program**	III.A6.3-a	**3.5.1-24**	**A**
Steel Components: All Structural steel *III.A6.2*	NSR Structural Support Structural Support	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.A3.2-a	**3.5.1-20**	**C**
Stop Logs	NSR Structural Support	Carbon Steel	Raw Water	Loss of Material	**Service Water Pond Dam Inspection Program**	III.A6.2-a	**3.5.1-22**	**C**

Table 3.5.2-6 (cont'd) Structures and Component Supports, Water Control Structures – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Traveling Screen	Debris Protection NSR Structural Support	Stainless Steel	Raw Water	Loss of Material	**Structural Monitoring Program**			J

Table 3.5.2-7 Structures and Component Supports, Steel Tank Structures (Foundations and Retaining Walls) – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Bolting	NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.A8.2-a	**3.5.1-20**	**A, 33**
Concrete Pedestals	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**C, 54**
Concrete: Exterior above grade (shield and retaining walls)	Flood Barrier NSR Structural Support Shelter / Protection Structural Support	Concrete - Reinforced	Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-d	**3.5.1-20**	**C, 54**

Table 3.5.2-7 (cont'd) Structures and Component Supports, Steel Tank Structures (Foundations and Retaining Walls) – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Concrete: Foundation *III.A8.1*	Shelter / Protection Structural Support	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A8.1-b	**3.5.1-20**	**A, 53**
						III.A8.1-d	**3.5.1-21**	**A, 54**
Steel Components: All Structural Steel *III.A8.2*	NSR Structural Support Shelter / Protection Structural Support	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.A8.2-a	**3.5.1-20**	**A**

Table 3.5.2-8 Structures and Component Supports, Yard Structures – Summary of Aging Management Review

Component Type *GALL Reference*	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Voume 2 Item	Table 1 Item	Notes
Bolting	NSR Structural Support	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.B4.1-a	**3.5.1-29**	**C, 33**
Concrete: Foundation	NSR Structural Support Shelter / Protection	Concrete - Reinforced	Below Grade	Change in Material Properties, Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-b	**3.5.1-20**	**C, 53**
						III.A3.1-e	**3.5.1-21**	**C, 54**
			Outside	Cracking and Loss of Material	**Structural Monitoring Program**	III.A3.1-e	**3.5.1-21**	**C, 54**
Equipment Frames and Housings	NSR Structural Support Shelter / Protection	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.B4.1-a	**3.5.1-29**	**C**

Table 3.5.2-8 (cont'd) Structures and Component Supports, Yard Structures – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Vourne 2 Item**	**Table 1 Item**	**Notes**
Fire Door	Fire Barrier NSR Structural Support Shelter / Protection	Carbon Steel	Inside	Loss of Material	**Fire Protection Program**	VII.G.3-d	**3.3.1-20**	**C, 56**
Masonry Wall	Fire Barrier NSR Structural Support Shelter / Protection	Masonry Block	Inside	Cracking	**Structural Monitoring Program**	III.A3.3-a	**3.5.1-24**	**C**
Steel Components: All Structural Steel	NSR Structural Support Shelter / Protection	Carbon Steel	Outside	Loss of Material	**Structural Monitoring Program**	III.B5.1-a	**3.5.1-29**	**C**

Table 3.5.2-9 Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Battery Racks	NSR Structural Support Structural Support	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.B3.1-a	**3.5.1-29**	**C**
RPV Supports	Shelter / Protection Structural Support	Carbon Steel	Inside	Loss of Material	**Structural Monitoring Program**	III.A4.2-a	**3.5.1-20**	**C, 57**

Table 3.5.2-9 (cont'd) Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
ASME & Non-ASME Piping and Component Support Members	NSR Structural Support Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B1.1.1-b	**3.5.1-31**	**A, 46** **C** (aux bldg)
(Includes support members, welds; bolted connections, support anchorage to building structure)			Inside and Outside	Loss of Material	**Inservice Inspection Program**	III.B1.1.1-a III.B1.2.1-a	**3.5.1-32**	**A**
					Structural Monitoring Program	III.B1.1.1-a III.B1.2.1-a	**3.5.1-32**	**E**
						III.B2.1-a	**3.5.1-29**	**A**
III.B1.1.1, *III.B1.2.1,* *III.B2.1*		Stainless Steel	Inside	None	None Required			**F**

Table 3.5.2-9 (cont'd) Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Constant and variable load spring hangers, guides, stops; sliding surfaces; vibration isolators (For ASME piping and components) *III.B1.1.3,* *III.B1.2.2*	NSR Structural Support Structural Support	Carbon Steel	Inside	Loss of Material	**Inservice Inspection Program**	III.B1.1.3-a III.B1.2.2-a	**3.5.1-32**	**A, 47**
					Structural Monitoring Program	III.B1.1.3-a III.B1.2.2-a	**3.5.1-32**	**E**
				Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B1.1.1-b	**3.5.1-31**	**C**

Table 3.5.2-9 (cont'd) Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Cable Trays, Conduit, Ducts, Tube Track (Includes support members, welds; bolted connections, support anchorage to building structure) *III.B2.1*	NSR Structural Support Structural Support	Aluminum and Stainless Steel	Inside and Outside	None	None Required			**F**
		Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B2.1-b	**3.5.1-31**	**A, C** (Aux Bldg)
			Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.B2.1-a	**3.5.1-29**	**A**
Racks, Panels, Cabinets, etc. (Includes support members, welds; bolted connections, support anchorage to building structure) *III.B3.1*	NSR Structural Support Shelter / Protection Structural Support	Aluminum Stainless Steel	Inside	None	None Required			**F**
		Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B3.1-b	**3.5.1-31**	**A, C** (Aux Bldg)
			Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.B3.1-a	**3.5.1-29**	**A**

Table 3.5.2-9 (cont'd) Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
EDG, HVAC, Miscellaneous Mechanical Equipment Supports (Includes support members, welds; bolted connections, support anchorage to building structure) *III.B4.1*	NSR Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B4.1-b	**3.5.1-31**	**A, C** (Aux Bldg)
	Structural Support		Inside and Outside	Loss of Material	**Structural Monitoring Program**	III.B4.1-a	**3.5.1-29**	**A**

Table 3.5.2-9 (cont'd) Structures and Component Supports, Component Supports – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Platforms, Pipe Whip Restraints, etc. (Includes support members, welds; bolted connections, support anchorage to building structure) *III.B5.1*	HE/ME Shielding NSR Structural Support Pipe whip Restraint Structural Support	Carbon Steel	Inside	Loss of Material	**Borated Water Leakage Assessment and Evaluation Program**	III.B5.1-b	**3.5.1-31**	**A, C** (Aux Bldg)
				Loss of Material	**Structural Monitoring Program**	III.B5.1-a	**3.5.1-29**	**A**

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

30. The operating temperatures for these components are below the threshold for stress corrosion cracking.
33. The FNP process addresses bolting as a commodity regardless of the component type with which the bolting is associated.
46. Based on our review of the aging mechanism of boric acid corrosion was not specifically evaluated for this component type.
47. Aging effect terminology used in GALL is different but overall detoriation is the same.
53. Aging mechanism of 'Leaching of Calcium Hydroxide' is considered applicable for FNP based on NRC ISG-03 and/or plant condition.
54. Aging mechanism of 'Corrosion of Embedded Steel' is considered applicable for FNP based on NRC ISG-03 and/or plant condition.
56. Aging effect matches with GALL but not Aging Mechanism.
57. Lubrite plate not used for RPV Support at FNP.

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3.6 AGING MANAGEMENT OF ELECTRICAL COMPONENTS

3.6.1 INTRODUCTION

This section provides the results of the aging management review of the electrical components identified in **Table 2.5.1**. The following system is addressed in this system group (with the applicable Section 2 reference in parentheses):

- Plant-Wide Electrical (**Section 2.5.1**)

Table 3.6.1, Summary of Aging Management Evaluations for Electrical Components in Chapter VI of NUREG-1801, provides a summary comparison of the FNP aging management activities with the aging management activities evaluated in NUREG-1801 for the electrical 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 3.0.3**.

3.6.2 RESULTS

The following tables summarize 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 electrical systems in **Section 3.6.2.1.1**.

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

3.6.2.1.1 Plant Wide Electrical Aging Management Review Results

Materials

Electrical components requiring an aging management review are constructed of both metallic and non-metallic materials.

Metallic materials are primarily:

- copper
- aluminum
- brass
- silver plating
- zinc plating
- carbon steel
- stainless steel

Non-metallic materials include cable insulation, jackets, terminal blocks, fuse blocks, and cable connectors constructed of:

- EP rubber
- cross-linked polyethylene
- ETFE
- Kerite FR
- chlorosulfonated polyethylene (hypalon)
- phenolic
- lexan
- porcelain
- cement

Switchyard insulators are made of porcelain. Oil static cables are a special type of cable in-scope for SBO. These cables are constructed of various organic polymers, copper, brass, phosphor bronze, zinc alloy, carbon steel, stainless steel, aluminum, porcelain, synthetic rubber, fiberglass, somastic-coated carbon steel pipe, and polybutene oil.

Environments

Electrical components requiring an aging management review are exposed to the following environments:

- heat, radiation, or moisture
- moisture and voltage stress
- outside
- borated water leakage
- buried
- inside
- lube oil

Most plant cables are exposed to the inside environment of various plant buildings and structures. This environment is controlled by HVAC, but areas of high temperature, radiation, and moisture can exist. Design values of temperature and radiation are used in the evaluation of aging effects for electrical components. Any localized areas of high temperature or radiation will be detected by the aging management program described below and in **Appendix B.5.6**.

The moisture and voltage stress environment applies to medium voltage cables in outdoor duct banks. Pull boxes and ducts can fill with water if not controlled, exposing the cables to submergence. The portion of the oil-static cable system that contains electrical conductors is both buried and outside. The pumps and piping associated with the oil-static cable pressurization system (Section 2.3.3.20) are inside and buried. The interior environment for all portions of the oil-static cable system is lube oil. The outside environment also applies to cable bus duct and other switchyard components.

Aging Effects Requiring Management

The following aging effects associated with electrical components require management:

- reduced insulation resistance
- loss of material

The borated water leakage environment was considered for electrical connectors. However, connectors are protected from borated water leakage by their location within protective enclosures and by design features which seal the enclosures along with associated conduit and cable entrances.

Loss of material was identified as an aging effect requiring management for the oil static cable.

Aging effects for fuse holders were given special consideration based upon the guidance of ISG-5. Fatigue of metal clips due to mechanical wear and thermal cycling was evaluated for fuse holders. 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 are de-energized, power is normally removed at the safety-related power supply or by opening links on terminal blocks. Therefore, fatigue due to mechanical stress is not considered an aging effect requiring management.

Vibration could be induced in fuse holders by the operation of external equipment, such as compressors, fans, and pumps. Since the fuse holders in the scope of this review are located in panels which are seismically mounted on their own support structure separate from sources of vibration, vibration is not considered an applicable aging mechanism.

Corrosion of metallic clamps could occur if the fuse holders were located in humid environments or exposed to water or boric acid leakage. The fuse holder panels are NEMA 12 rated enclosures which protect the fuse holders from external sources of moisture. In addition, these NEMA 12 enclosures are located inside rooms that protect the panels from the weather, and there are no sources of potential mechanical system leakage in proximity to the panels, that is not being aged managed. With regard to internal moisture, a review of plant-specific operating experience did not reveal any instance of aging as a result of the formation of condensation internal to the panels. Based upon recent inspections of the fuse blocks, the surface condition of the fuse clips show no signs of corrosion. Additionally, there is no evidence of moisture.

No aging effects requiring management were identified for in-scope fuse holders.

Aging Management Programs

The following aging management programs are applied to electrical components:

- Non-EQ Cables Program (**Appendix B.5.6**)
- External Surfaces Monitoring Program (**Appendix B.5.3**)
- Buried Piping and Tank Inspection Program (**Appendix B.5.4**)

NUREG-1801 Program XI.E1, “Electrical Cables and Connections Not Subject To 10 CFR 50.49 Environmental Qualification Requirements” (**Appendix B.5.6**) will be used to manage aging effects of all electrical components within the license renewal scope which have aging effects requiring management. This is an overall program for electrical components which encompasses various activities for the different component types. It includes adverse environment inspections and walkdowns for non-EQ cables, pull box inspections and water elimination activities for medium voltage potentially submerged cables per NUREG-1801 Program XI.E3, and special tests for certain neutron monitoring instrumentation cables per alternate NUREG-1801 Program XI.E2.

3.6.2.2 Further Evaluation of Aging Management As Recommended By NUREG-1801 for Electrical Components

NUREG-1801 has no recommendations for electrical components.

3.6.2.3 Time-Limited Aging Analyses (TLAAs)

The TLAA's identified below are associated with electrical components.

- Environmental Qualification of Electrical Components (**Section 4.4**).

3.6.3 CONCLUSION

The Electrical components subject to aging management review have been identified in accordance with the scoping and screening criteria of 10 CFR 54.4. 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	Qualified life calculations for environmentally qualified electrical components are treated as TLAAs, and are discussed in **Section 4.4**.
3.6.1-2	Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced insulation resistance (IR); electrical failure caused by thermal/ thermoxidative degradation of organics; radiolysis and photolysis (ultraviolet [UVI sensitive materials only) of organics; radiation-induced oxidation; moisture intrusion	Aging management program for electrical cables and connections not subject to 10 CFR 50.49 EQ requirements	No	The component/component type AMR results for FNP are consistent with NUREG-1801. Cable bus is included in this line item. Oil-static cables are not included in this line item. The FNP aging management program for these cables is described in **Appendix B.5.6.**

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	Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance	Embrittlement, cracking, melting, discoloration, swelling, or loss of dielectric strength leading to reduced IR; electrical failure caused by thermal/ thermoxidative degradation of organics; radiation-induced oxidation; moisture intrusion	Aging management program for electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements	No	The component/component type AMR results for FNP are consistent with NUREG-1801 except for certain aging management program activities. The FNP aging management program for these cables is described in **Appendix B.5.6.**
3.6.1-4	Inaccessible medium-voltage (2 kV to 15 kV) cables (e.g., installed in conduit or direct buried) not subject to 10 CFR 50.49 EQ requirements	Formation of water trees' localized damage leading to electrical failure (breakdown of insulation); caused by moisture intrusion and water trees	Aging management program for inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements	No	The component/component type AMR results for FNP are consistent with NUREG-1801. The aging management program is described in **Appendix B.5.6**.

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
3.6.1-5	Electrical connectors not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage	Corrosion of connector contact surfaces caused by intrusion of borated water	Boric acid corrosion	No	The component/component type AMR results for FNP are consistent with NUREG-1801 except for the aging management program. FNP found that the aging effects for this material/environment combination do not require management and therefore, no aging management program is required.

Table 3.6.2-1 Electrical Components – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Electrical cables and connections not subject to 10 CFR 50.49 EQ Requirements *VI.A.1.1*	Provide electrical connections	Various organic polymers (e.g., EPR, ETFE, Kerite FR, XLPE)	Heat, radiation, or moisture	Reduced Insulation Resistance	**Non-EQ Cables Program**	VI.A.1-a	**3.6.1-2**	**A**, **62**
Electrical cables used in instrumentation circuits not subject to 10 CFR 50.49 EQ requirements that are sensitive to reduction in conductor insulation resistance *VI.A.1.2*	Provide electrical connections	Various organic polymers (e.g., EPR, ETFE, Kerite FR, XLPE)	Heat, radiation, or moisture	Reduced Insulation Resistance	**Non-EQ Cables Program**	VI.A.1-b	**3.6.1-3**	**E**, **62**

Table 3.6.2-1 (cont'd) Electrical Components – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Electrical connectors not subject to 10 CFR 50.49 EQ requirements that are exposed to borated water leakage *VI.A.2*	Provide electrical connections	Various metals used for electrical contacts	Borated water leakage	None	None Required	VI.A.2-a	**3.6.1-5**	**A**
Fuse Holders	Provide electrical connections	Various organic polymers, copper, carbon steel, brass, silver plating, zinc coating, and porcelain	Heat, radiation, or moisture	None	None Required			**J**, **62**
High-Voltage Insulators	Insulate and support an electrical conductor	Porcelain, metal, and cement	Outside	None	None Required			**J**

Table 3.6.2-1 (cont'd) Electrical Components – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Inaccessible medium-voltage cables not subject to 10 CFR 50.49 EQ requirements *VI.A.1.3*	Provide electrical connections	Various organic polymers (e.g., EPR, ETFE, Kerite FR, XLPE)	Moisture and voltage stress	Reduced Insulation Resistance	**Non-EQ Cables Program**	VI.A.1-c	**3.6.1-4**	**A**, **63**
Metal Enclosed Cable Bus	Provide electrical connections	Various organic polymers, aluminum, stainless steel, and fiberglass	Outside	None	None Required			**J**

Table 3.6.2-1 (cont'd) Electrical Components – Summary of Aging Management Review

Component Type *GALL Reference*	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Oil-Static Cables	Pressure Boundary	Carbon steel, somastic-coated pipe, and polybutene oil	Buried	Loss of Material	**Buried Piping and Tank Inspection Program**			**J**
		Carbon steel, stainless steel, and polybutene oil	Inside and Outside	Loss of Material	**External Surfaces Monitoring Program**			**J**, **61**
	Provide electrical connections	Various organic polymers, copper, brass, phosphor bronze, zinc alloy, aluminum, porcelain, synthetic rubber, fiberglass	Lube Oil	None	None Required			**J**

Table 3.6.2-1 (cont'd) Electrical Components – Summary of Aging Management Review

Component Type ***GALL Reference***	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Programs**	**NUREG-1801 Volume 2 Item**	**Table 1 Item**	**Notes**
Switchyard Bus	Provide electrical connections	Aluminum and steel	Outside	None	None Required			J
Transmission conductors	Provide electrical connections	Aluminum and steel	Outside	None	None required			J

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

61. Consistent with NUREG-1801, Volume 2 for mechanical systems. Loss of material is an aging effect requiring management for carbon steel components located outside.
62. The environment listed in GALL is "heat, radiation, or moisture". The environment of "heat, radiation, or moisture" addresses the effects of these stressors in the LRA included environment of "Inside".
63. The environment listed in GALL is "moisture and voltage stress". The environment of "moisture and voltage stress" addresses the effects of moisture and voltage stress on medium-voltage cables in the LRA included environment of "Submerged".

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. 3, Nuclear Energy Institute, March 2001.

3. NUREG 1800,Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, U.S. Nuclear Regulatory Commission, July 2001.

4. NUREG-1801, “Generic Aging Lessons Learned Report,” Volumes 1 and 2, NRC, April 2001.

SECTION 4 TIME-LIMITED AGING ANALYSES

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4.0 INTRODUCTION

Two areas of technical review are required to support an application for a renewed operating license. The first area of technical review is the Integrated Plant Assessment, described in Sections 2 and 3. The second area of technical review is the identification and evaluation of plant-specific time-limited aging analyses and exemptions, provided in this chapter.

The evaluations included in this section meet the requirements contained in 10 CFR 54.21(c) and allow the NRC to make the finding contained in 10 CFR 54.29(a)(2).

4.1 IDENTIFICATION OF TIME-LIMITED AGING ANALYSES

4.1.1 BACKGROUND

10 CFR 54.3 and 10 CFR 54.21 are particularly germane to time-limited aging analyses (TLAAs). 10 CFR 54.21(c) requires applicants to include in their applications a list of the design basis analyses that contain time-limited or age-related assumptions. These sections are as follows:

Section 54.21 Contents of Application – technical information

(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 10CFR50.12 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 an analysis or calculation that meets six criteria:

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 PROCESS TO IDENTIFY FNP TIME-LIMITED AGING ANALYSES

SNC used two independent methods to identify TLAAs for FNP that are consistent with NEI 95-10 (**Ref. 1**). The first method 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 the design calculations to identify TLAAs. These two methods were then compared to compile a complete list of TLAAs for FNP.

In the first method, the SNC focus was on a review of the CLB, as contained in the FNP correspondence docket and the FNP 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 10CFR 54.3 to develop a complete list of TLAAs from the CLB record.
In the second method, SNC focused its review on the design calculations performed by Bechtel Power Corporation (the previous architect engineer), the Southern Company Services, Inc., (SCS) Engineering organization (the current architect engineer), and the Westinghouse Electric Company (W) for the Nuclear Steam Supply System equipment scope.

To identify the scope of calculations to review, SNC compiled a complete list from the FNP Calculation Record database for Bechtel and SCS calculations. SNC reviewed these calculations for the applicability of Criterion 3 of 10 CFR 54.3 – that is, on assumptions or design elements related to the current operating term of 40 years. SNC then evaluated the calculations that met Criterion 3 against the remaining five criteria for being a TLAA.

Westinghouse also conducted a review of their calculation record for the design of the FNP 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 FNP. This list is summarized in **Table 4.1.2**. Specifically, **Table 4.1.2** provides a list of common TLAAs from NUREG-1800 (**Ref. 2**) and those TLAAs that are particular to FNP.

Table 4.1.2 Potential Time-Limited Aging Analysis

Description	Applicable to FNP	Section
Reactor vessel neutron embrittlement	Yes	**4.2**
Concrete containment tendon prestress	Yes	**4.3.4**
Metal fatigue	Yes	**4.3**
Environmental qualification of electrical equipment	Yes	**4.4**
Metal corrosion allowance	No	N/A
Inservice flaw growth analyses that demonstrate structure stability for 40 years	No	N/A
High-energy line-break postulation based on fatigue cumulative usage factor	Yes	**4.3.1**
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	**4.2.3**
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	**4.3.2**
Fatigue analysis of polar crane	No	N/A
Flow-induced vibration endurance limit, transient cycle count assumptions, and ductility reduction of fracture toughness for the reactor vessel internals	No	N/A
Leak before break	Yes	**4.5.2**
Fatigue analysis for the containment liner plate	No	N/A
Containment penetration pressurization cycles	No	N/A
Reactor vessel circumferential weld inspection relief (BWR)	No	N/A

Table 4.1.2 (cont'd) Potential Time-Limited Aging Analysis

Description	Applicable to FNP	Section
RHR Safety Relief Valve Flow Capacity Verifications for Cold Overpressure Mitigation Analysis	Yes	**4.5.3**
Fatigue of Reactor Vessel Supports	Yes	**4.3.5**
Silting of the Ultimate Heat Sink	Yes	**4.5.1**

4.1.3 IDENTIFICATION OF EXEMPTIONS

SNC 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.

The result of the review is that there are no 10 CFR 50.12 exemptions for FNP that meet the definition of a TLAA.

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 FNP design contains TLAAs that address the effects of neutron irradiation embrittlement of the reactor vessels for both units. The calculations have been updated to address the additional 20 years of operation. For FNP, 54 EFPY are sufficient to cover the current and extended operating term. 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).

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**) **Table 4.2.1** summarizes the Unit 1 and 2 peak fluence values for 54 EFPY of operation (**Ref. 4**).

The updated calculations show that the margins required in Appendix G will be maintained, even after 54 EFPY of operation.

Table 4.2.1 Summary of Peak Fluence Values Used to Determine the Limiting Beltline Material

0° Fluence			45° Fluence		
Surface	**1/4T**	**3/4T**	**Surface**	**1/4T**	**3/4T**
FNP Unit 1 (54 EFPY)					
6.41	4.00	1.55	2.01	1.25	0.487
FNP Unit 2 (54 EFPY)					
6.29	3.92	1.52	2.04	1.27	0.494

Note:

All fluence values are in units of 10^{19} n/cm^2 E > 1 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 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 FNP, SNC has projected these analyses (**Ref. 4**) to the end of the extended period of operation, in accordance with the approved methods of Regulatory Guide 1.99, Revision 2 (**Ref. 5**). The most limiting Unit 1 locations for USE are the Lower Shell Longitudinal Weld Seams 20-894A&B (Heat #90099, at the 45° azimuth), which have a projected End of Life (EOL) USE of 52.8 ft-lbs. For Unit 2, the limiting USE location is Intermediate Shell Plate B7212-1 (surveillance capsule data used), which has a projected EOL USE of 58 ft-lbs. A summary of the results for the FNP beltline materials is provided in **Tables 4.2.2-1** and **4.2.2-2** for Units 1 and 2, respectively. These TLAAs are shown to be acceptable in accordance with 10 CFR 54.21(c)(1)(ii). In accordance with the Reactor Vessel Surveillance Program (cf. Appendix B, Section B.3.4), SNC may update the USE calculations to include credible data from future analyses of surveillance capsules that are pulled in the future.

Table 4.2.2-1 FNP Unit 1 Predicted End-of-License (54 EFPY) USE Calculations For all the Beltline Region Materials

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 B6903-2	0.13	4.00	99	30	69
Intermediate Shell Plate B6903-3	0.12	4.00	87	29	62
Lower Shell Plate B6919-1	0.14	4.00	86	31	59
Lower Shell Plate B6919-2	0.14	4.00	86	31	59
Intermediate Shell Longitudinal Weld Seams 19-894 (Heat # 33A277) (45° Azimuth) – Using Surveillance Capsule Data)	0.258	1.25	149	26	110
Intermediate to Lower Shell Circumferential Weld Seam 11-894 (Heat # 6329637)	0.205	4.00	104	46	56
Lower Shell Longitudinal Weld Seams 20-894A & B (Heat #90099) (45° Azimuth)	0.197	1.25	82.5	36	52.8

Table 4.2.2-2 FNP Unit 2 Predicted End–of-License (54 EFPY) USE Calculations For all the Beltline Region Materials

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 B7203-1	0.14	3.92	100	32	68
Intermediate Shell Plate B7212-1 Using Surveillance Capsule Data	0.20	3.92	100	42	58
Lower Shell Plate B7210-1	0.13	3.92	103	30	72
Lower Shell Plate B7210-2	0.14	3.92	99	32	67
Intermediate Shell Longitudinal Weld Seam 19-923A (Heat # HODA) (45° Azimuth)	0.03	1.27	131	20	105
Intermediate Shell Longitudinal Weld Seam 19-923B (Heat # BOLA) (45° Azimuth) – Using S/C Data	0.027	1.27	148	9.5	134
Intermediate to Lower Shell Circumferential Weld Seam 11-923 (Heat # 5P5622)	0.153	3.92	102	40	61
Lower Shell Longitudinal Weld Seams 20-923A & B (Heat # 83640) (45° Azimuth)	0.051	1.27	126	20	101

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 Part 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 FNP, these RT_{PTS} calculations meet the definition of a TLAA.

SNC has updated the RT_{PTS} calculations for FNP Units 1 and 2 to cover the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). 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 limiting material for FNP Unit 1 is the Lower Shell Plate B6919-1, which has 54 EFPY RT_{PTS} value of 191°F (**Ref. 4**). The limiting material for FNP Unit 2 is the Intermediate Shell Plate B7212-1, which has a 54 EFPY RT_{PTS} value of 239°F (**Ref. 4**). In accordance with the Reactor Vessel Surveillance Program (**Appendix B.3.4**), 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 FNP Unit 1 Values of RT_{PTS} at 54 EFPY

Material	FF	CF (°F)	$\triangle RT_{PTS}$ [a] (°F)	Margin [b] (°F)	$RT_{NDT(U)}$ [c] (°F)	RT_{PTS} [d] (°F)
Intermediate Shell Plate B6903-2	1.45	91.0	132.0	34	0	166
Intermediate Shell Plate B6903-3	1.45	82.2	119.2	34	10	163
Lower Shell Plate B6919-1	1.45	97.8	141.8	34	15	191
→ Using Non-Credible Surveillance Capsule Data	1.45	93.3	135.3	34[e]	15	184
Lower Shell Plate B6919-2	1.45	98.2	142.4	34	5	181
Intermediate Shell Longitudinal Weld Seams 19-894 A & B (Heat # 33A277)	1.19	126.2	150.2	66	-56	160
→ Using Credible Surveillance Capsule Data	1.19	118.6	141.1	44	-56	129
Circumferential Weld 11-894 (Heat # 6329637)	1.45	98.4	142.7	66	-56	153
Lower Shell Longitudinal Weld Seams 20-894- A & B (Heat # 90099)	1.19	91.4	108.8	66	-56	119

Notes:

(a) ΔRT_{PTS} = CF*FF, FF = $f^{(0.28 - 0.10 \log f)}$, where f is the best estimate of the neutron fluence, in units of 10^{19} n/cm^2 (E > 1.0 MeV), at the clad to base metal interface on the inside surface of the vessel.

(b) Margin = $2*(\sigma_{\triangle}^{2} + \sigma_{i}^{2})^{½}$, where for welds $\sigma_{\triangle}$ is 28°F for welds and 17°F for plates not to exceed ½ $\triangle RT_{NDT}$ and σ_i is 0 if $RDT_{NDT(U)}$ is measured or 17°F if $RDT_{NDT(U)}$ is generic (See Note "c").

(c) $RT_{NDT(U)}$ values are measured values with exception to the welds.

(d) $RT_{PTS} = RT_{NDT(u)} + \triangle RT_{PTS}$ + Margin (°F)

(e) Per NRC guidance, margin used here is the full $\sigma_{\triangle}$ value of 17°F since the surveillance plate data is not credible. If the data were credible the $\sigma_{\triangle}$ margin would be 8.5°F.

Table 4.2.3-2 FNP Unit 2 Values of RT_{PTS} at 54 EFPY

Material	**FF**	**CF (°F)**	**ΔRT_{PTS}[a] (°F)**	**Margin[b] (°F)**	**$RT_{NDT(U)}$[c] (°F)**	**RT_{PTS}[d] (°F)**
Intermediate Shell Plate B7203-1	1.44	100	144.0	34	15	193
Intermediate Shell Plate B7212-1	1.44	149	214.6	34	-10	239
→ Using Credible Surveillance Capsule Data	1.44	139.5	200.9	17	-10	208
Lower Shell Plate B7210-1	1.44	89.8	129.3	34	18	181
Lower Shell Plate B7210-2	1.44	98.7	142.1	34	10	186
Intermediate Shell Longitudinal Weld Seams 19-923 A (Heat HODA)	1.19	36.8	43.8	55.4	-56	43
Intermediate Shell Longitudinal Weld Seams 19-923 B (Heat BOLA)	1.19	36.8	43.8	43.8	-60	28
→ Using Credible Surveillance Capsule Data	1.19	3.6	4.3	4.3	-60	-51
Circumferential Weld 11-923 (Heat # 5P5622)	1.44	74.1	106.7	56	-40	123
Lower Shell Longitudinal Weld Seams 20-923 A & B (Heat # 83640)	1.19	37.3	44.4	44.4	-70	19

Notes:

(a) ΔRT_{PTS} = CF*FF, FF = $f^{(0.28 - 0.10 \log f)}$, where f is the best estimate of the neutron fluence, in units of 10^{19} n/cm^2 (E > 1.0 MeV), at the clad to base metal interface on the inside surface of the vessel.

(b) Margin = $2*(\sigma_{\Delta}^{2} + \sigma_{i}^{2})^{½}$, where for welds σ_{Δ} is 28°F for welds and 17°F for plates not to exceed ½ ΔRT_{NDT} and σ_i is 0 if $RDT_{NDT(U)}$ is measured or 17°F if $RDT_{NDT(U)}$ is generic (See Note "a").

(c) $RT_{NDT(U)}$ values are measured values with exception to the weld 19-923A.

(d) $RT_{PTS} = RT_{NDT(u)} + \Delta RT_{PTS}$ + Margin (°F)

4.2.4 ADJUSTED REFERENCE TEMPERATURE

The calculations to determine the 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 54 EFPY 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:

FNP Unit 1: Lower Shell Plate B6919-1 with an ART at ¼-T of 182 °F (**Ref. 4**).

FNP Unit 2: Intermediate Shell Plate B7212-1 with and ART at ¼-T of 195 °F (**Ref. 4**).

The Unit 2 ART is based upon NRC Regulatory Guide 1.99, Revision 2, position 2.1 using credible surveillance capsule data.

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 P-T. Plant specific calculations establish these limits. The calculations utilize materials and fluence data obtained through plant specific reactor surveillance capsule programs. The calculations for FNP Units 1 and 2 meet the definition of a TLAA.

The P-T limit curves that apply for the current operating conditions at FNP are included in the Pressure and Temperature Limits Report (PLTR) for each unit. 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 for the unit. The P-T limit curves may be updated further based upon data gained from capsules SNC pulls in accordance with the Reactor Vessel Surveillance Program (**Appendix B.3.4**) (Demonstration is made in accordance with 10 CFR 54. 21(c)(1)(iii)).

4.3 METAL FATIGUE

The FNP design for several in-scope SSCs addresses the effects of metal fatigue. Cracking due to the fatigue of ASME Section III Class 1 components, Non-Class 1 components, the reactor coolant pump flywheel, and the reactor vessel supports, as well as loss of pre-stress in containment tendons, are aging effects for which calculations were performed based upon the original license term. The sections which follow discuss these types of calculations in more detail.

4.3.1 FATIGUE OF ASME CLASS 1 COMPONENTS

The design of FNP incorporates the requirements of Section III of the ASME Code, which requires a discrete analysis of the thermal and dynamic stress cycles on components that make up the reactor coolant pressure boundary. The required analysis was performed for FNP and incorporated a set of design transients, many of which were stated to be for the original 40-year operating life of the plant. **Table 4.3.1** lists the transients from the FNP FSAR (**Ref. 6**) and the number of cycles assumed for 40-years. The table also lists the number of cycles that SNC anticipates will occur through the end of the extended term of operation. SNC has reviewed the transient cycle assumptions against the anticipated cycles and has determined that the assumed transient cycles are conservative for 40 years and bounding for the extended term of operation, except in certain specific cases described below.

The design basis for the FNP Pressurizer Surge Line included a stress analysis to ensure that cumulative fatigue usage would remain below the Code allowable. SNC has evaluated the cumulative fatigue on the pressurizer surge line and will address the fatigue for the renewal term through fatigue monitoring. SNC has installed computerized monitoring equipment that uses stress-based fatigue monitoring software. This equipment collects real-time data on the pressurizer surge line operation, and the software can calculate the impact on the fatigue of the surge line. This data will enable SNC to establish a current estimate of the fatigue usage of the critical piping and pressurizer components. With this fatigue monitoring software, SNC will have advance notice that the CUF is approaching 1.0 and be able to take remedial action, if necessary. The design basis for the FNP RHR suction lines includes an analysis of the impact of thermal stratification on certain portions of these lines. An analysis was performed in support of the FNP response to NRC Inspection and Enforcement Bulletin (IEB) 88-08 (**Ref. 7**). The analysis meets the definition of a TLAA, pursuant to 10 CFR 54.3. SNC evaluated the appropriate methods to update this analysis and decided that monitoring the actual transients on the line through the fatigue monitoring software to show that the assumptions in the Westinghouse analysis will not be exceeded during 60 years of operation is the most appropriate method to demonstrate that the aging mechanism will not lead to cracking at the lines (demonstration in accordance with 10 CFR 54.21 (c)(1)(iii)).

Thermal stratification of the pressurizer surge line and the resultant fatigue effects are similarly treated for FNP. In support of the SNC response to NRC IEB 88-11 (**Ref. 8**), an evaluation of the impact of thermal stratification on the surge line was performed. The fatigue usage value calculated by SNC's fatigue monitoring software includes the impact of thermal stratification upon the cumulative fatigue of the surge line (demonstration in accordance with 10 CFR 54.21 (c)(1)(iii)).
With respect to environmentally assisted fatigue 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 (Ref 9). The specific locations evaluated and the results are:

***Reactor Vessel Shell and Lower Head* (Ref 4)**

The cumulative usage factor (CUF) for the vessel wall transition of the FNP reactor vessels is 0.0603. Although the inside surface of the vessel is clad with stainless steel and Alloy 600, it is appropriate not to perform a fatigue analysis of the cladding, and to assume that the reactor coolant is in contact with the low alloy steel vessel wall underneath the cladding, as was done in the NUREG/CR-6260 analysis. Therefore, the maximum environmental factor for low alloy steel from NUREG/CR-6583 (**Ref. 10**) of 2.53 should be applied for an environmental fatigue adjusted value of 0.1526, which is less than 1.0 and therefore acceptable.

***Reactor Vessel Inlet and Outlet Nozzles* (Ref. 4)**

The maximum CUF for the FNP reactor vessel inlet and outlet nozzles of 0.2871 occurs at the inside surface of the outlet nozzle at the vessel support pad. Use of the maximum environmental factor for low alloy steel from NUREG/CR-6583 (**Ref. 10**) of 2.53 increases the maximum CUF value to an environmental fatigue adjusted value of 0.7264, which is less than 1.0 and therefore acceptable.

***Surge Line* (Ref. 11)**

Using stress based fatigue monitoring software, 6 cooldown/heatup cycles for Unit 1 and 4 cooldown/heatup cycles for Unit 2 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 0.015 on Unit 1 and 0.019 for Unit 2. Applying the maximum environmental factor for stainless steel from NUREG/CR-5704 (**Ref. 12**) of 15.35 to the higher value for Unit 2 results in an environmental fatigue adjusted value of 0.2719, which is less than 1.0 and therefore acceptable.

***Charging Nozzle* (Ref. 13)**

The maximum design CUF for the charging nozzle is 0.7746 at the crotch region. With a maximum environmental factor for stainless steel from NUREG/CR-5704 (**Ref. 12**) of 15.35, the maximum CUF increases to an environmental fatigue adjusted value of 11.8901, which is not acceptable. Prior to the start of the extended operating period, SNC will take corrective action which might include a more refined analysis, replacement of the charging and alternate charging nozzles, or an inspection program approved by the NRC.

***Safety Injection Nozzle* (Ref. 14)**

This location in Section 5.4 of NUREG/CR-6260 is the BIT nozzle that connects the 1½-inch boron injection line to the reactor coolant system at the cold leg. At FNP, the 2-inch boron injection lines tee into 6-inch RHR/SI lines that connect to the reactor coolant system at cold leg nozzles. Therefore, the most appropriate location at FNP to evaluate for this location is the BIT line to RHR/SI tee with the highest CUF. The maximum design CUF for this location is 0.1070 for Unit 1 and 0.0128 for Unit 2. With an environmental factor for stainless steel from NUREG/CR-5704 (**Ref. 12**) of 2.55 for temperatures below 200°C, the maximum environmentally-assisted CUF increases to 0.2725 and 0.0326 for Units 1 and 2, respectively, which is less than 1.0 and therefore acceptable.

Residual Heat Removal (RHR) System Class 1 Piping **(Ref. 13)**

This location in Section 5.4 of NUREG/CR-6260 is the stainless steel inlet piping transition. The most appropriate location for FNP is the 6-inch RHR/SI nozzle to the reactor coolant system cold leg. The maximum design CUF for the RHR/SI nozzle is 0.7912 on Unit 1. With a maximum environmental factor for stainless steel from NUREG/CR-5704 (**Ref. 12**) of 15.35 the maximum CUF increases to an environmental fatigue adjusted value of 12.1449, which is not acceptable. Prior to the start of the extended operating period, SNC will take corrective action which might include a more refined analysis, replacement of the RHR/SI cold leg nozzles, or an inspection program approved by the NRC.

Table 4.3.1 Class 1 Thermal Fatigue Cycles

Transient Description	**Cycles assumed for 40 years**[1]	**Current Cycle Count**[2]	**Estimated cycles for 60 years**[2]
Reactor Coolant System Heat-up at 100 °F per hour	200	36/19	75/65
Reactor Coolant System Cooldown at 100 °F per hour	200	32/22	75/65
Pressurizer Heat-up	200	(**Note 5**)	(**Note 3**)
Pressurizer Cooldown at 200 °F per hour	200	18/15	(**Note 3**)
Unit Loading and Unloading at 5% of Full Power per Minute	18300 (each)	(**Note 4**)	(**Note 4**)
Small Step Increase in Load (10% of Full Power per Minute)	2000	(**Note 5**)	(**Note 5**)
Small Step Decrease in Load (10% of Full Power per Minute)	2000	(**Note 5**)	(**Note 5**)
Large Step Decrease in Load	200	(**Note 5**)	(**Note 5**)
Steady State Fluctuations	Infinite	(**Note 6**)	< Infinite
Turbine Roll Test	10	<10 / <10	(**Note 7**)
Loss of Load Without Reactor Trip	80	5/4	< 20 / < 20
Loss of Offsite Power	40	2/2	< 10 / < 10

Table 4.3.1 (cont'd) Class 1 Thermal Fatigue Cycles

Transient Description	Cycles assumed for 40 years[1]	Current Cycle Count[2]	Estimated cycles for 60 years[2]
Loss of RCS Flow in One Loop	80	4/4	< 20 / < 20
Reactor Trip from Full Power (includes Steam Generator Tube Rupture)	400	75/45	<200 / <200
Inadvertent Auxiliary Spray	10	0/0	1/1
Operating Basis Earthquake	5	0/0	1/1
Primary Side Leak Test	50	0/0	< 10 / < 10
Primary Side Hydro Test	5	1/1	1/1
Secondary Side Hydro Test	10	2/1	2/1
Main Reactor Coolant Pipe Break	1	0/0	1/1
Main Steam Line Break	1	0/0	1/1
Safe Shutdown Earthquake	1	0/0	1/1

Notes:

1. Cycle counts taken from Table 5.2-2 of FNP FSAR (**Ref. 6**).
2. As of 1/1/03. Number before slash is unit 1; number after slash is unit 2.
3. This transient set is superceded by specific modeling of the pressurizer, surge nozzle, and surge line and the fatigue monitoring software.
4. This transient is included to account for load-following operation. FNP has not been used to follow loads and SNC does not plan to operate FNP in that fashion in the future.
5. This transient was not counted until installation of fatigue monitoring software. Prior to the period of extended operation, SNC will collect data for the transients not counted prior to the installation of the fatigue monitoring software and use it to develop a best estimate historical count and an expected 60-year count.
6. This transient is not counted and does not need to be since an infinite number is allowed.
7. No more turbine roll tests are anticipated for either unit.

4.3.2 FATIGUE OF THE REACTOR COOLANT PUMP FLYWHEEL

The design of the flywheels for the reactor coolant pumps at FNP contains an assumption that the pump will be subjected to 4000 start/stop cycles. The calculations that prove the design are for the life of the component. SNC conservatively elects to treat these calculations as TLAAs. The 4000 start/stop cycles are conservative for 60 years of operation. Therefore, the calculations are adequate as-is and do not require updating for License Renewal (demonstration in accordance with 10 CFR 54.41(c)(1)(i)).

4.3.3 FATIGUE OF ASME NON-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), SNC's position is that thermal stresses on piping will bound thermal stresses on other components in the system. The design of ASME III Code Class 2 and 3 piping systems at FNP incorporates the Code stress reduction factor 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 Code requirements also incorporate the stress reduction factor based upon an assumed number of thermal cycles. In general, 7000 thermal cycles are assumed, leading to a stress reduction factor of 1.0 in the stress analyses. SNC evaluated the validity of this assumption for 60 years of plant operation. The results of this evaluation indicate that the 7000 thermal cycle assumption is valid and bounding for 60 years of operation. Therefore, the existing pipe stress calculations are valid for the extended term of operation in accordance with 10 CFR 54.21(c)(1)(i).

Several previous applicants for license renewal have estimated that their piping in their primary sampling system will have more than 7000 thermal cycles through the end of the renewed term of operation. The Sampling System (SAMPL) tubing at FNP will also see more than 7000 thermal cycles through the end of the renewed term; however, this tubing was designed accounting for 22,000 thermal cycles (slightly more than one cycle per day for 60 years). Through the end of the extended license term, the air start subsystem for the EDGs will also see more than 7000 thermal cycles. The piping in the air start system will be subjected to cycling at significantly less than its design temperature range, such that the equivalent number of full-temperature cycles for the piping will be less than 7000 cycles. The piping for this subsystem has been evaluated and is adequately designed to handle the expected thermal cycles. Therefore, the TLAA for these components is adequate for the renewed term, in accordance with 10 CFR 54.21(c)(1)(i).

4.3.4 CONTAINMENT TENDON PRESTRESS

To meet the requirements on 10 CFR 50.55a(b)(2)(ix)(B), SNC uses an analysis to predict the amount of residual of prestress in the containment tendons for FNP. This analysis meets the definition of a TLAA. SNC performed a new analysis to estimate the amount of residual prestress on the tendons after 60 years of operation (demonstration in accordance with 10 CFR 54.21(c) (1) (ii)). The new calculation includes the latest measurements of containment tendon prestress taken since the plant began commercial operation. The calculation indicates that acceptable containment tendon prestress will continue to exist throughout the extended period of operation.

SNC may further update this analysis with the results of the anchor pull testing performed in accordance with the IWL Inspection program (**Appendix B.3.1**).

4.3.5 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. In the SER for this WCAP the NRC has indicated that licensees must ensure that a later version of the AISC was used. The design of FNP used the 1969 version of the AISC, and therefore, the existing analysis is adequate for the extended term of operation (10 CFR 54.21(c)(1)(i)).

4.4 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL 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 FNP 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.

As a result of this application, no additional components will be added to the FNP 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 FNP 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 extended period of operation (**Appendix B.3.7**), hence the TLAAs will be managed by an Aging Management Program in accordance with 10 CFR 54.21(c)(1)(iii).

See **Table 4.4** for a list of EQ packages.

Table 4.4 List of EQ Packages

EQ Package No. or A-506152 Sheet No.	Description
01A	Amphenol Coaxial Connectors (ABB-CE)
01B	Amphenol Coaxial Connectors (Westinghouse)
02	ASCO NP-1 Series Solenoid Valves
03A	ITT Barton Model 763 Gage Pressure Transmitters
03B	ITT Barton Model 764 Differential Pressure Transmitters
04	ITT Barton Remote Sensors Model 351/S048
06	BIW Instrumentation Cable
07A	Brand-Rex Coaxial Cable
07B	Brand-Rex Thermocouple Extension Cable
07C	Brand-Rex Ultrol Type SIS Switchboard Wire
08	Champlain 600 Volt Wires and Cables
09A	Electric Conductor Seal Assembly (ECSA)
09B	Electrical Penetration FTAs for CETs and HJTCs
09C	Instrumentation Electric Penetration Assembly
09E	Feedthrough/Adapter Module Assemblies for G.E. Penetrations
10	Conax RTDs and Thermocouples (TCs)
11	Electroswitch Lockout Relays
12	MI Cables using ERD Connectors for CET, HJTC and LLP Systems
13	Fisher E/P Converter Foxboro or Weed Gauge Pressure Transmitters
14A	Foxboro or Weed Gauge Pressure Transmitters
14B	Foxboro or Weed Differential Pressure Transmitters
15	Neutron Flux Monitoring System

Table 4.4 (cont'd) List of EQ Packages

EQ Package No. or A-506152 Sheet No.	Description
16A	GEMS Delaval Wide Range Level Transmitter and Level Switch
16B	GEMS Delaval Narrow Range Level Transmitter
17	RHR, CHG. PUMP and CTMT. Spray Room Cooler Fan Motors (600V AC)
18	Electrical Penetrations (Low Voltage) 100 Series
19	GE CR151 Series Terminal Blocks
20	HJTC/LLP Assembly with Retrofitted G&H Connector
21	ITT Surprenant SIS Wire
22	Joy Containment Fan Motors
22A	Penetration Room Filtration Unit Fan Motors
23A	Limitorque MOV Actuators Inside Containment
23B	Limitorque MOV Actuators Inside MSR
23C	Limitorque MOV Actuators Outside Containment and Outside MSR
25A	EA180-XX302 Series Limit Switches with RX490 Material
25B	NAMCO EA170-XX302 Series Limit Switches with RX490 Material
25C	EC210 Series Receptacle and Connector/Cable Assemblies
25D	EA180-XX302 Series Limit Switches with RX865 or RX865M Material
25E	Silicone Rubber Sealant
25F	EA180-XX602/EC210-29XXX Series Limit Switch Assembly with RX490 Material
25G	EA180-XX602 Series Limit Switch Assembly with RX865 or RX865M Material
25H	NAMCO EA170-XX302 Series Limit Switches with RX865 or RX865M Material

Table 4.4 (cont'd) List of EQ Packages

EQ Package No. or A-506152 Sheet No.	Description
26A	Okonite EPR Insulated Cables
26B	Okonite FMR Insulated Cables
26C	Okoguard Insulated Cables & T-95 & No. 35 Splicing Tapes
27	Okonite OKOZEL Insulated Instrumentation Cables
28	Raychem Flamtrol Thermocouple & 1000 Volt Control Cables
29A	Raychem Heat Shrink Tubing as Shim
29B	WCSF-N In-line Crimped Butt Type Splice Assemblies (up to 1000V
29C	Raychem Nuclear Plant Splice Kit - Type "V" Stub Connection
29D	Raychem NMCK Stub (V) Motor Connection Kits (up to 1 kV) with Bonded End Caps
29E	8 KV Motor Connection Kits - "In-Line Type"
29F	Nuclear Cable Breakout and End Sealing Kits
29I	8 kV Motor Connection Kits Stub (or V) Connection
29J	Nuclear Plant Low Voltage Cable Splice Kit (Up To 1 kV)
29K	Raychem WCSF-N and NMCK In-line Bolted Splices (up to 1 kV)
29L	Nuclear Grade Adhesive S1119
29M	Raychem Nuclear Plant Kit for Coaxial Connection
29N	Raychem NMCK-V Motor Connection Kits (up to 1kV) with Molded End Caps
30	Rosemount (Westinghouse) Model 176KS Wide Range RTDs
31A	Rosemount 1153 Series D Transmitters with Code "R" Electronics
31B	Rosemount Model 1154 Pressure Transmitters
31C	Rosemount Model 1153DD3PA Differential Pressure Transmitter
33	Conduit Seal

Table 4.4 (cont'd) List of EQ Packages

EQ Package No. or A-506152 Sheet No.	Description
34	States Terminal Blocks
35A	Target Rock Solenoid Valves Supplied By Westinghouse
35B	Target Rock Solenoid Valves
36A	Class 1E Circuit Breakers for Telemecanique MCCs
36B	Telemecanique Motor Control Centers (MCCs) & Disconnect Starters
36C	Class 1E 120 V AC Auxiliary Relays for Telemecanique MCCs
37	Class 1E Penetration Protection Cabinets
37A	Motor Short Circuit Protectors
39	Victoreen HRCM System Detector and Connectors
40	Weidmuller Terminal Blocks
41	Electric Hydrogen Recombiner
42	Electrical Instrumentation Penetrations
43	Westinghouse 4 kV Pump Motors
44	Texaco Greases and Oils
45	Rockbestos Coaxial Cable
45A	Rockbestos Firewall III Type SIS 600V Switchboard Wire
46	Masoneilan I/P Transducer
47	Class 1E Motors Rewound At GPC Repair Shop
48	Bussmann Fuses and Fuse Mounting Equipment
51	MI Cable, Connectors & Penetration Assemblies for Victoreen HRCM
52	Weed (Westinghouse) Model N9004 RTDs

Table 4.4 (cont'd) List of EQ Packages

EQ Package No. or A-506152 Sheet No.	Description
53A	ITT Conoflow I/P Transducer (Non-line Mounted)
54	EGS GRAYBOOT Connectors for Instrument, Power & Control Circuits
55	Phoenix Ceramic Terminal Blocks
56	Reliance 4 KV Form Wound Motors
57	EGS Multi-Pin, Quick-Disconnect Electrical Connectors
58	Gulton-Statham Pressure Transmitters
59	Valcor Solenoid Valves
60	GE Control Relay and Mounting Bracket
61	Penetration Room Filtration System Heater
62	ASCO Tri-point Temperature Switch
63	Electrical Splices using UCI Tape
64	Automatic Valve Solenoid Valves
65	Telmacanique 5600 MCC Replacement Components

4.5 OTHER PLANT SPECIFIC ANALYSES

4.5.1 ULTIMATE HEAT SINK SILTING

The ultimate heat sink for FNP is a pond in which silt deposition (silting) may occur. Excessive silting could impact the total volume of water available to achieve safe shutdown and maintain long-term shutdown cooling following a design basis accident. SNC conducts a regular surveillance to confirm water volume in the pond. The acceptance criteria for this surveillance involves a volume versus pond level depth curve that is calculated with 40-year assumptions as to the amount of silting that could occur without adversely impacting the volume of the pond. This calculation (**Ref. 16**) utilizes depth-sounding data taken as part of the surveillance. Although silting of the pond is a questionable aging effect, SNC conservatively calls this analysis a TLAA.

SNC has updated the design calculations to include the pertinent depth-sounding data and to address the additional 20 years of operations in the extended term in accordance with 10 CFR 54.21(c)(1)(ii). The acceptance curve currently in use is conservative and bounding for 60 years of operation.

4.5.2 LEAK-BEFORE-BREAK ANALYSIS

Westinghouse performed a Leak-Before-Break (LBB) analysis for FNP for the primary coolant loop (**Ref. 17**) and the pressurizer surge line (**Ref. 18**). LBB analyses evaluate postulated flaw growth in the piping for the reactor coolant loops and the surge line. SNC has evaluated these analyses and has determined that the analyses meet the definition of a TLAA.

For the LBB analysis of the pressurizer surge line, the analysis is bounding for 60 years, in accordance with 10 CFR 54.21(c)(1)(i). There are two reasons for this determination. First, the materials analyzed are not particularly susceptible to thermal aging, so the calculation made no 40 year assumption regarding thermal aging. Second, the transient cycles assumed in the analysis are bounding for 60 years.

For the primary coolant loop, SNC determined that the LBB analysis required updating to account for the extended license term, in accordance with 10 CFR 54.21(c)(1)(ii). This update has been performed (**Ref.19**). The result of the update shows that crack growth in the lines is negligible and that the environmental factor for reactor water environments is not a significant parameter in the analysis.

4.5.3 RHR RELIEF VALVE CAPACITY VERIFICATION CALCULATIONS

SNC takes credit for the relief capacity of the RHR relief valves in the Cold Over-pressure Mitigation Analysis for FNP. SNC has a calculation that verifies relief valve capacity given the safe-operating pressure and temperature limit curves. The calculation adjusts the P-T Limit Curves to account for the flow-induced pressure drop from the beltline of the reactor vessel to the RHR relief valves. This calculation (**Ref. 20**) currently evaluates changes to P-T Limit Curves for 16, 24, 36, and 48 EFPY. The calculation meets the definition of a TLAA, pursuant to 10 CFR 54.3. Since SNC is evaluating the P-T Limit Curves for 54 EFPY for renewal, the calculation needs to be updated.

Pursuant to 10 CFR 54.21(c)(1)(ii), SNC will update this analysis to include the calculated 54 EFPY P-T Limit Curves prior to entering the period of extended operation.

4.6 REFERENCES

1. NEI 95-10, Revision 3, “Industry Guidance for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” March 2001.
2. NUREG-1800, Revision 0, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” April 2001.
3. USNRC Regulatory Guide 1.190, “Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence,” March 2001.
4. T.W. Wallace to D. N. Morey, October 16, 2001, “Time Limited Aging Analysis for Reactor Vessels.”
5. USNRC Regulatory Guide 1.99, Revision 2, “”Radiation Embrittlement of Reactor Materials,” May 1988.
6. Joseph M. Farley Nuclear Plant Final Safety Analysis Report, Section 5.2
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-6583, “Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels.”
11. FNP-01Q-301, Revision 0, “Surge Line and Pressurizer Lower Head Fatigue Analysis,” Structural Integrity Associates, July 2003.
12. NUREG/CR-5704, “Effects of LWR Coolant Environments of Fatigue Design Curves of Austenitic Stainless Steels.”
13. FNP-01Q-305, Revision 1, “Environmental Fatigue Calculations,” Structural Integrity Associates, July 2003, (Westinghouse Proprietary).
14. FNP-01Q-304, Revision 0, “Calculation of the Fatigue Usage for 2” BIT Tee to 6” RHR/SI Piping for Evaluation of Environmental Effects,” Structural Integrity Associates, July 2003.
15. WCAP-14422, Revision 2a, “Licensing Renewal Evaluation: Aging Management for Reactor Coolant System Supports, Westinghouse General Technical Report,” December 2000.
16. SM-ES-89-1500-001, Revision 1, “Ultimate Heat Sink – Depth Vs. Volume and Depth Vs. Surface Area Curves,” Southern Company Services, April 1990.
17. WCAP-12825, “Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Design Basis for the Joseph M. Farley Units 1 and 2 Nuclear Power Plants,” January 1991 (Westinghouse Proprietary).
18. WCAP-12835, “Technical Justification for Eliminating Pressurizer Surge Line Rupture from the Structural Design basis for FNP Units 1 and 2,” April 1991 (Westinghouse Proprietary).
19. WCAP-12825 Addendum 1, “Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Design Basis for the Joseph M. Farley Units 1 and 2 Nuclear Power Plants for License Renewal,” December 2002 (Westinghouse Proprietary).
20. SM-90-1706-001, Revision 6, “Evaluate RHR Relief Valve Flow,” Southern Company Services, July 1998.

APPENDIX A FINAL SAFETY ANALYSIS REPORT SUPPLEMENT

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A.1.0 INTRODUCTION

This appendix provides the Final Safety Analysis Report (FSAR) supplement required by 10 CFR 54.21(d) for the FNP License Renewal Application (LRA). The information presented here will be incorporated into the FNP FSAR as Chapter 18 following issuance of the renewed operating license.

For the purposes of the application, the programs are presented here in a manner that makes correlation to Appendix B easier. The numbering for the final version of FSAR Chapter 18 may result in the order being changed.

A.1.1 EXISTING AGING MANAGEMENT PROGRAMS

Existing programs are those for which no significant changes had to be made to provide reasonable assurance that their continued implementation would adequately manage aging during the extended period of operation. These programs compared well with their counterparts described as adequate in NUREG-1801. The following programs fall into that category:

- Inservice Inspection Program (Including Subsections IWB, IWC, IWD, IWE, IWL and IWF) (**A.2.1**)
- Water Chemistry Control Program (**A.2.2**)
- Service Water Pond Dam Inspection Program (**A.2.3**)
- Reactor Vessel Surveillance Program (**A.2.4**)
- Borated Water Leakage Assessment and Evaluation Program (**A.2.5**)
- Overhead and Refueling Crane Inspection Program (**A.2.6**)
- Steam Generator Program (**A.2.7**)

A.1.2 ENHANCED AGING MANAGEMENT PROGRAMS

Some existing programs had to be modified to some extent in order to provide consistency with the programs described in NUREG-1801, thereby providing reasonable assurance that their continued implementation, along with the improvements described in Appendix B, would adequately manage aging during the extended period of operation Those programs are shown below.

- Flow Accelerated Corrosion Program (**A.2.8**)
- Fuel Oil Chemistry Control Program (**A.2.9**)
- Structural Monitoring Program (**A.2.10**)
- Service Water Program (**A.2.11**)
- Fire Protection Program (**A.2.12**)

A.1.3 NEW AGING MANAGEMENT PROGRAMS

New programs fall into two categories. One includes activities that may have been done in the past, but SNC felt lacked the substantive level of formality needed to manage aging during the extended period of operation. The other category includes new programs or activities that are not being performed under the current licensing basis (CLB). The new programs are shown below.

- Reactor Vessel Internals Program (**A.2.13**)
- Flux Detector Thimble Inspection Program (**A.2.14**)
- External Surfaces Monitoring Program (**A.2.15**)
- Buried Piping and Tank Inspection Program (**A.2.16**)
- One-Time Inspection Program (**A.2.17**)
- NiCrFe Component Assessment Program (**A.2.18**)
- Non-EQ Cables Program (**A.2.19**)

A.1.4 TIME LIMITED AGING ANALYSES (TLAA) MANGEMENT PROGRAMS

The programs credited for TLAA management in the FNP license renewal application are shown below. These programs will provide for management of the associated time limited aging analyses during the extended period of operation.

- Environmental Qualification Program (**A.3.1**)
- Fatigue Monitoring Program (**A.3.2**)

A.1.5 TLAA EVALUATIONS

The evaluation of time-limited aging analyses for the extended period of operation is required by 10 CFR 54.21(d) to be contained in the Final Safety Analysis Report (FSAR) supplement. That evaluation is provided in **Section A.4.0**.

A.2.0 AGING MANAGEMENT PROGRAMS

A.2.1 INSERVICE INSPECTION PROGRAM

The Inservice Inspection Program will be implemented during the renewal term in accordance with 10 CFR 50.55a, which imposes the inservice inspection requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, for Class 1, 2, and 3 (Subsections IWB/IWC/IWD) pressure-retaining components and their integral attachments, containment and integral attachments (Subsections IWE/IWL) and the applicable component supports (Subsection IWF).

The continued implementation of the ASME Section XI, Subsections IWB, IWC, IWD, IWE, IWL and IWF of the FNP Inservice Inspection Program, including use of the examination requirements, examination methods, acceptance stands and frequencies contained in 10 CFR 50 Appendix J for IWE Category E-P components, will provide reasonable assurance that the aging effects will be managed such that the systems and components within the scope of the program will continue to perform their intended functions consistent with the licensing basis for the renewal term.

This program is consistent with 10 attributes of the collection of acceptable programs described in NUREG-1801 Sections XI.M1, XI.M3, XI.M12, XI.S1, XI.S2, XI.S3, and XI.S4.

A.2.2 WATER CHEMISTRY CONTROL PROGRAM

The Water Chemistry Control Program will manage aging during the period of extended operation through maintenance of low levels of detrimental impurities and the use of chemical additives.

The Primary Water Chemistry Control Program will be based upon the guidance provided in EPRI TR-105714.

The Secondary Water Chemistry Control Program will be based upon the guidance provided by EPRI TR-102134.

The Closed Cooling Water Chemistry Control Strategic Plan will be based upon the guidance contained in EPRI TR-107396.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M2. It is also consistent with the 10 attributes of the aging management program described in Section XI.M21, with the exception that FNP applies performance monitoring in accordance with the EPRI guidelines for Closed Cooling Water.

A.2.3 SERVICE WATER POND DAM INSPECTION PROGRAM

The service water pond dam and spillway will be inspected during the period of extended operation on a periodic basis in accordance with Nuclear Regulatory Commission (NRC) Regulatory Guide 1.127, rev. 1, "Inspection of Water-Control Structures Associated with Nuclear Power Plants." The service water pond dam inspection performed in accordance with Regulatory Guide 1.127 is an acceptable basis for in-service inspection and surveillance of the dam, its slopes, and associated spillway. The service water pond dam inspection(s) include the earthen dam, the service water pond embankments and the spillway slopes.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.S7.

A.2.4 REACTOR VESSEL SURVEILLANCE PROGRAM

The Reactor Vessel Surveillance Program will be used to predict changes in reactor vessel beltline material fracture toughness during the period of extended operation. The program will be used to evaluate neutron embrittlement through surveillance capsule testing and evaluation, fluence calculations and benchmarking, and monitoring of effective full power years (EFPYs). For fluence calculations, FNP uses Regulatory Guide 1.190 which provides for a "best estimate" fluence calculation.

A.2.5 BORATED WATER LEAKAGE ASSESSMENT AND EVALUATION PROGRAM

The Borated Water Leakage Assessment and Evaluation program implements the plant-specific commitments made in response to NRC Generic Letter 88-05. The program is applicable to areas where there are carbon steel and low-alloy steel structures or components, or electrical components, on which borated reactor water might leak.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M10.

A.2.6 OVERHEAD AND REFUELING CRANE INSPECTION PROGRAM

The Overhead and Refueling Crane Inspection Program will be used during the period of extended operation to manage the effects of general corrosion of the crane bridge and trolley structural girders and beams and the crane rails and support girders for the spent fuel bridge, spent fuel cask and the containment polar cranes. The contacting surfaces of the steel rails of these components will be periodically inspected in accordance with plant procedures.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M23.

A.2.7 STEAM GENERATOR PROGRAM

The Steam Generator Program used to perform replacement steam generator tube surveillance in accordance with the Technical Specifications will be continued during the period of extended operation. The program will be based upon NEI 97-06, "Steam Generator Program Guidelines" or its successors.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M19.

A.2.8 FLOW ACCELERATED CORROSION PROGRAM

Flow Accelerated Corrosion Program activities include analysis to determine susceptible locations, baseline inspections of wall thickness, follow up inspections and predictive modeling techniques. These activities will provide reasonable assurance that systems will perform their intended safety function(s) during the period of extended operation.

The Flow Accelerated Corrosion Program will be enhanced prior to entering the extended period of operation by adding the auxiliary feedwater pump turbine exhaust piping to the scope of the program.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M17.

A.2.9 FUEL OIL CHEMISTRY CONTROL PROGRAM

The Fuel Oil Chemistry Program is governed by Technical Specifications. It will continue to include surveillance and maintenance procedures to mitigate corrosion as well as measures to verify the effectiveness of this aging management program and confirm the absence of an aging effect. Fuel oil quality will maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines contained in selected American Society for Testing Materials Standards.

The specific ASTM Standards that FNP uses as guidelines for sampling and sample analysis are governed by the Plant Technical Specifications and differ from those cited in NUREG-1801, Section XI.M30. Parameters important to corrosion are monitored by the FNP Program, and no significant difference exists in the ability of the program to manage aging effects

SNC will evaluate the scope of the program and the need to improve procedural guidance for maintaining and monitoring the diesel driven fire pump fuel oil system such that there is reasonable assurance that the system will perform its intended function during the extended period of operation. If changes are necessary, FNP will make them prior to the period of extended operation.

The FNP Fuel Oil Chemistry Program is consistent with the 10 attributes of the aging management program described in NUREG-1807, Section XI.M30, except as noted above.

A.2.10 STRUCTURAL MONITORING PROGRAM

The FNP Structural Monitoring Program (SMP) is based upon the requirements and guidance set forth in 10 CFR 50.65 and Regulatory Guide 1.160. SNC will continue to use 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 during the period of extended operation. The SMP also addresses the masonry wall considerations identified in NRC IE Bulletin 80-11 and NRC Information Notice 87-67.

The FNP Structural Monitoring Program will be enhanced to include provisions to monitor structures and components during the period of extended operation which are in-scope for license renewal but are not currently monitored under the program.

This program is consistent with the 10 attributes of the aging management programs described in NUREG-1801, Sections XI.S5 and S6.

A.2.11 SERVICE WATER PROGRAM

The Service Water (SW) Program activities implement the recommendations of NRC Generic Letter 89-13. Mitigation, as well as performance and condition monitoring techniques are used to manage fouling and loss of material in the SW system and components it serves. Collectively, these activities provide reasonable assurance that the SW system will perform its intended safety function(s) during the period of extended operation.

The scope of the Service Water Program will be enhanced prior to the extended period of operation to include inspection of piping from the main service water header to the air compressor credited for Appendix R safe shutdown and the service water pump columns.

This program is consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M20.

A.2.12 FIRE PROTECTION PROGRAM

The Fire Protection Program will provide inspections, performance testing, monitoring, and aging management activities during the period of extended operation for water and gas based fire protection systems, fire dampers, fire doors, fire penetration seals, cable wrap and fire pump diesels (including the external surfaces of exposed fuel oil piping).

SNC will implement enhancements to the FNP Fire Protection Program prior to entering the extended period of operation through the use of administrative controls and procedures.

- The fire protection sprinkler system piping will be subjected to wall thickness evaluations (e.g., non-intrusive volumetric testing and/or visual inspections during plant maintenance) prior to the period of extended operation and at specific intervals thereafter. The plant specific inspection interval will be established from the initial inspection results and revised as appropriate for subsequent inspection results.

- A sample of sprinklerheads will be inspected by using the guidance of National Fire Protection Association (NFPA) 25 (2002), Section 5.3.1.1.1, at or before 50 years service and every 10 years thereafter.

- Diesel driven fire pump surveillance procedures will be upgraded to provide more detailed instructions related to inspection of the fuel oil supply piping.

- The current practice of replacing CO_2 hoses at 5 year intervals will be formalized in fire protection procedures.

This program is consistent with the 10 attributes of the aging management programs described in NUREG-1801, Sections XI.M26 and M.27, as amended by Interim Staff Guidance ISG-04.

A.2.13 REACTOR VESSEL INTERNALS PROGRAM

The new FNP Reactor Vessel Internals Program will be implemented prior to entering the period of extended operation to provide an integrated inspection program that addresses the reactor internals. It will be governed by administrative controls and procedures to supplement the inspection requirements of ASME Section XI, IWB Category B-N-3 to ensure that aging effects do not result in a loss of intended function of internal components during the period of extended operation.

The program will be used during the period of extended operation to manage the effects of crack initiation and growth due to irradiation assisted stress corrosion cracking; loss of fracture toughness due to irradiation embrittlement, thermal embrittlement, or void swelling; or changes in material properties (dimension) due to void swelling.

A.2.14 FLUX DETECTOR THIMBLE INSPECTION PROGRAM

The new Flux Detector Thimble Inspection Program will be implemented prior to entering the period of extended operation to formalize examinations already being performed. The program will be administratively controlled by plant procedures. It will be used to identify loss of material due to fretting/wear in the detector thimbles during the extended period of operation.

A.2.15 EXTERNAL SURFACES MONITORING PROGRAM

The External Surfaces Monitoring Program will be a new plant-specific condition monitoring program that will be implemented prior to entering the period of extended operation. It will include periodic visual inspections of external surfaces of carbon steel, low alloy steel and other susceptible materials in components requiring aging management for license renewal.

Plant procedures and administrative controls will be developed to provide for surface condition monitoring of selected equipment and components for signs of corrosion or wear. Periodic inspections of accessible portions of piping and tubing will be performed to detect signs of loss of material, flange leakage, missing or damaged insulation, damaged coatings, and fretting of tubing.

Accessible in-scope polymers or elastomers will also be inspected for age related degradation. Susceptible materials or components will include accessible fasteners, ventilation systems seals and collars, other polymers and elastomers, copper, aluminum and coated steel structural components which are not within the scope of the Structure Monitoring Program.

A.2.16 BURIED PIPING AND TANK INSPECTION PROGRAM

The new Buried Piping and Tank Inspection Program will be used to manage the loss of material from external surfaces of pressure-retaining buried carbon steel piping and tanks during the extended period of operation. Administrative controls and procedures will be put in place to ensure that buried piping and tanks will be inspected when they are excavated for maintenance or when those components are exposed for any reason. This new program will be implemented prior to the period of extended operation.

This program will be consistent with the 10 attributes of the aging management program described in NUREG-1801, Section XI.M34.

A.2.17 ONE TIME INSPECTION PROGRAM

The One Time Inspection Program will be implemented prior to the period of extended operation. The One Time Inspection Program will include measures to verify the effectiveness of various other aging management programs and confirm the absence of aging effects. Insofar as practical with respect to scheduled outages, the inspections will be performed within a window of five years immediately preceding the period of extended operation.

The program will be administratively controlled by plant procedures. Administrative controls and procedures will be developed to identify the specific components which must be included, as well as the systems from which the remaining sample set will be collected.

This program is consistent with the 10 attributes of the aging management programs described in NUREG-1801, Sections XI.M32 and M33.

A.2.18 NiCrFe COMPONENT ASSESSMENT PROGRAM

The Plant Specific NiCrFe Component Assessment Program will be implemented prior to the period of extended operation to address the potential for primary water stress corrosion cracking (PWSCC) in nickel alloy components exposed to the reactor coolant environment. This new program will assess nickel base alloy component susceptibility to PWSCC and provide for any required augmented inspection requirements to ensure that the component functions will be maintained during the period of extended operation. Administrative controls and procedures will be developed to implement the program.

The scope will include nickel base alloy reactor coolant pressure boundary components with known or potential susceptibility to PWSCC, excluding steam generator tubes, which are specifically addressed by the Steam Generator Program, and Reactor Internals which are addressed by the Reactor Internals Inspection Program.

A.2.19 NON-EQ CABLES PROGRAM

The Non-EQ Cables Program will be a new monitoring program that will be implemented prior to the period of extended operation. It will be used to maintain the function of electrical cables 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.

The program will be administratively controlled by procedures. The scope will include: 1) accessible electrical cables installed in adverse localized environments caused by heat or radiation, coupled with the presence of oxygen, 2) electrical cables used in circuits with sensitive, high voltage, low-level signals such as radiation monitoring and nuclear instrumentation and, 3) inaccessible medium voltage cables that are exposed to significant moisture and voltage at the same time.

This program is consistent with the 10 attributes of the aging management programs described in NUREG-1801, Sections XI.E.1 and E.3, and for Section XI.E2 as amended by Interim Staff Guidance ISG-05 and the alternate program drafted by the License Renewal Working Group.

A.3.0 TIME-LIMITED AGING ANALYSES (TLAA) MANAGEMENT PROGRAMS

A.3.1 ENVIRONMENTAL QUALIFICATION PROGRAM

The Environmental Qualification (EQ) Program manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components not qualified for the applicable license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation.

This program is consistent with the attributes of the aging management program described in NUREG-1801, Section X.E1.

A.3.2 FATIGUE MONITORING PROGRAM

The design basis metal fatigue analyses for the FNP reactor coolant pressure boundary are TLAAs. The Fatigue Monitoring Program will be used to monitor plant transients that are significant contributions to the fatigue cumulative usage factor. Demonstration that plant cycles have not exceeded design assumptions during the period of extended operation will ensure that the design limit on fatigue usage will not be exceeded.

SNC will fully implement the program prior to entering the period of extended operation. When fully implemented, the program will include monitoring for thermal stratification at susceptible locations in addition to the current transient counting required by Technical Specifications. SNC has evaluated the effects of environmentally assisted fatigue on piping and components comparable to the locations evaluated in Section 5.4 of NUREG/CR-6260. The results of that evaluation are given in **Section A.4.2.1**.

This program is consistent with the attributes of the aging management program described in NUREG-1801, Section X.M1.

A.4.0 EVALUATION OF TIME LIMITED AGING ANALYSES (TLAA)

A.4.1 REACTOR VESSEL NEUTRON EMBRITTLEMENT ANALYSES

The reactor vessels are subjected to neutron irradiation from the core. This irradiation results in embrittlement of the reactor vessel materials. The following FNP analyses address the effects of neutron embrittlement of the reactor vessels for both units.

- Upper-Shelf Energy (USE)
- Pressurized Thermal Shock (PTS)
- Pressure-Temperature (P-T) Limits

A.4.1.1 Upper-Shelf Energy (USE) Calculation

Appendix G of 10 CFR Part 50 requires that the reactor vessel beltline materials must maintain a Charpy USE of no less than 50 ft-lbs throughout the life of the reactor vessel

SNC has projected the FNP analyses to the end of the period of extended operation for the limiting component of the beltline region materials. The limiting Unit 1 location has a projected end-of-life (EOL) USE of 52.8 ft-lbs. For Unit 2, the limiting USE location has a projected EOL USE of 58 ft-lbs. These TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10CFR 54.21(c) (1) (ii).

A.4.1.2 Pressurized Thermal Shock (PTS) Calculation

The requirements of 10 CFR 50.61 provide for protection against pressurized thermal shock events in pressurized water reactors. The screening criterion in § 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 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.

SNC has updated the RT_{PTS} calculations for FNP Units 1 and 2 to include the period of extended operation, and has determined that the screening criteria are met for both units. The limiting material for FNP Unit 1 has a 54 EFPY RT_{PTS} value of 191°F. The limiting material for FNP Unit 2 has a 54 EFPY RT_{PTS} value of 193°F. These TLAAs have been shown to be acceptable for the period of extended operation in accordance with 10CFR 54.21(c) (1) (ii).

A.4.1.3 Pressure Temperature (P-T) Limits Calculation

Appendix G of 10 CFR Part 50 requires heat-up and cool-down of the reactor pressure vessel be accomplished within established limits for P-T. Plant specific calculations establish these limits. The calculations utilize materials and fluence data obtained through plant specific reactor surveillance capsule programs.

The P-T limit curves that apply for the current operating conditions at FNP are included in the Pressure and Temperature Limits Report (PTLR) for each unit. 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 for the unit. SNC has updated the FNP P-T calculations, including the adjusted reference temperature (ART) values, to account for 54 EFPY in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.2 METAL FATIGUE ANALYSIS

The thermal fatigue analyses of the FNP mechanical components have been identified as TLAAs.

A.4.2.1 ASME Section III, Class 1 Component Fatigue Analysis

Section III of the ASME Code requires a discrete analysis of the thermal and dynamic stress cycles on components that make up the reactor coolant pressure boundary. The required analysis completed for FNP incorporated a set of design transients. SNC reviewed the transient cycle assumptions and determined that the assumed transient cycles are conservative for 40 years and bounding for the period of extended operation, except in the specific cases described below.

The design basis for the FNP pressurizer surge line includes a stress analysis to ensure that cumulative fatigue usage will remain below the ASME Code allowable. SNC has evaluated the cumulative fatigue on the pressurizer surge line and will manage it during the period of extended operation using the Fatigue Monitoring Program in accordance with 10 CFR 54.21 (c)(1)(iii).

The design basis for the FNP RHR suction lines includes an analysis of the impact of thermal stratification on certain portions of these lines. The analysis meets the definition of a TLAA, pursuant to 10 CFR 54.3. In accordance with 10 CFR 54.21 (c)(1)(iii), SNC will monitor the actual transients on these lines using the Fatigue Monitoring Program described in Section A.3.2 to show that the assumptions used in the analysis will not be exceeded during 60 years of operation.

Thermal stratification of the pressurizer surge line and the resultant fatigue effects are similarly treated for FNP. As part of the FNP response to NRC IE Bulletin 88-11 SNC prepared an evaluation of the impact of thermal stratification on the surge line. The fatigue usage value calculated using the Fatigue Monitoring Program includes the impact of thermal stratification upon the cumulative fatigue of the surge line (demonstration in accordance with 10 CFR 54.21 (c)(1)(iii)).

SNC has evaluated the effect of environmentally assisted fatigue (EAF) for locations equivalent to those presented in Section 5.4 of NUREG/CR-6260. The application of the appropriate environmental factors from NUREG/CR-6583 resulted in an acceptable environmentally assisted fatigue adjusted value less than 1.0.

- Reactor vessel shell and lower head
- Reactor vessel inlet and outlet nozzles
- Surge line hot leg nozzle
- Safety injection nozzle

The application of the appropriate environmental factors to the calculations for the following locations resulted in an EAF adjusted value greater than 1.0. For the locations listed below, SNC will take corrective action prior to the period of extended operation which may include a more refined analysis, replacement, or an inspection program approved by the NRC.

- Charging nozzles and alternate charging nozzles
- Residual heat removal 6-inch RHR/SI nozzles to the RCS cold leg

A.4.2.2 ASME Section III, Non-Class 1 Component Fatigue Analysis

For cracking due to thermal fatigue for in-scope FNP components outside the reactor coolant pressure boundary (non-Class 1), thermal stresses on piping will bound thermal stresses on other components in a system. The design of ASME Code Section III Class 2 and 3 piping systems at FNP incorporates the Code stress reduction factor 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 Code requirements also incorporate the stress reduction factor based upon an assumed number of thermal cycles. In general, 7000 thermal cycles are assumed, leading to a stress reduction factor of 1.0 in the stress analyses. SNC evaluated the validity of this assumption for 60 years of plant operation. The results of this evaluation indicate that the 7000 thermal cycle assumption is valid and bounding for 60 years of operation. Therefore, the existing pipe stress calculations are valid for the extended term of operation in accordance with 10 CFR 54.21(c)(1)(i).

SNC has determined that 22000 thermal cycles are assumed in the design for FNP small bore piping systems that receive a blowdown from the main steam or reactor coolant systems. This assumption has also been evaluated and determined to be bounding for 60 years of operation. For the air start system of the emergency diesel generators, 60 years of operation will produce more than 7000 thermal cycles. This piping has also been evaluated and found to be acceptable as designed. Therefore, the TLAA for these components is adequate for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(i).

A.4.3 CONTAINMENT TENDON PRE-STRESS ANALYSIS

To meet the requirements on 10 CFR 50.55a(b)(2)(ix)(B), SNC used an analysis to predict the amount of residual of pre-stress in the containment tendons for FNP. This analysis meets the definition of a TLAA. SNC performed a new analysis to estimate the amount of residual pre-stress on the tendons after 60 years of operation (demonstration in accordance with 10 CFR 54.21(c) (1) (ii)).

The new calculation includes the latest measurements of containment tendon pre-stress taken since the plant began commercial operation. The calculation indicates that acceptable containment tendon pre-stress will continue to exist throughout the extended period of operation.

A.4.4 ENVIRONMENTAL QUALIFICATION CALCULATIONS

The FNP Environmental Qualification Program described in Section A.3.1 meets the requirements of 10 CFR 50.49. The qualification reports and calculations that make up the EQ Program meet the definition of a TLAA. Qualified service lives for the EQ components have already been determined. EQ components 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, re-qualified, or replaced. The EQ program described in Section A.3.1 will be continued through the extended term of operation as an aging management program in accordance with 10 CFR 54.21(c)(1)(iii).

A.4.5 ULTIMATE HEAT SINK SILTING CALCULATIONS

The FNP ultimate heat sink (UHS) is a pond in which excessive silting could reduce the total volume of water available to maintain long-term shutdown cooling following a design basis accident. SNC conducts a regular surveillance to confirm water volume in the pond. The acceptance criteria for this surveillance involves a volume versus pond level curve that is calculated with 40-year assumptions as to the amount of silting that could occur without adversely impacting the volume of the pond and, therefore, meets the definition of a TLAA.

SNC has updated the calculations to include the pertinent depth-sounding data and to address the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii).

A.4.6 LEAK-BEFORE-BREAK ANALYSIS

A leak-before-break (LBB) analysis has been performed for the FNP primary coolant loop and the pressurizer surge line. LBB analyses evaluate postulated flaw growth in the piping for the reactor coolant loops and the surge line. These analyses meet the definition of a TLAA.

For the primary coolant loop, SNC has updated the LBB analysis to account for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(ii). For the LBB analysis of the pressurizer surge line, SNC has determined that the current analysis is bounding for 60 years, in accordance with 10 CFR 54.21(c)(1)(i).

A.4.7 RHR RELIEF VALVE CAPACITY VERIFICATION CALCULATIONS

SNC takes credit for the relief capacity of the RHR relief valves in the Cold Over-pressure Mitigation Analysis for FNP. SNC performed a calculation that verifies relief valve capacity given the safe operating P-T limit curves. The calculation adjusts the P-T Limit Curves to account for the flow-induced pressure drop from the beltline of the reactor vessel to the RHR relief valves. The calculation meets the definition of a TLAA. Pursuant to 10 CFR 54.21(c)(1)(ii), SNC will update this calculation to include the calculated 54 EFPY P-T Limit Curves prior to entering the period of extended operation.

A.5.0 REFERENCES

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

2. NUREG-1801, Generic Aging Lessons Learned (GALL) Report, U.S. Nuclear Regulatory Commission, April 2001

3. Joseph M. Farley Technical Specifications, Units 1 and 2

4. NRC Interim Staff Guidance (ISG)-04, Aging Management of Fire Protection Systems for License Renewal, December 3, 2002.

5. NRC Interim Staff Guidance (ISG)-05, Interim Staff Guidance on the Identification and Treatment of Electrical Fuse Holders for License Renewal, March 10, 2003

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APPENDIX B AGING MANAGEMENT PROGRAMS AND ACTIVITIES

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B.1.0 INTRODUCTION

Appendix B provides the descriptions of each aging management program (AMP) credited for managing the effects of aging during the renewal term. These programs include existing programs, existing programs that have been (or will be) enhanced to deal with specific aging effects, and new programs planned for implementation at FNP during the period of extended operation. The programs provide reasonable assurance that the effects of aging will be adequately managed so that the structures and components subject to aging management will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. In conjunction with the technical information contained in the body of this application, this appendix is intended to allow the NRC to make the finding required by 10 CFR 54.29(a)(1).

B.1.1 AGING MANAGEMENT PROGRAM OVERVIEW

FNP has compared the programs described in this appendix with the ten attributes described in NUREG-1800. The details of each attribute are presented only when the program is deemed not to be reasonably and materially consistent with the key elements of the program(s) described in NUREG-1801 for managing the applicable aging effect(s). Further clarification of this methodology is provided below.

B.1.2 PRESENTATION METHOD

FNP considers an AMP reasonably and materially consistent with NUREG-1801 when it meets the key elements of the attributes described for that program.

For these AMPs, FNP presents each program discussion in the following format:

- Program summary description
- NUREG-1801 consistency statement
- Statement of exceptions to NUREG-1801 program and a justification, where applicable
- Statement of any enhancements needed to ensure consistency NUREG-1801, or additional features FNP deems appropriate to manage aging for components, or aging effects not considered in NUREG-1801
- Operating experience information specific to the program
- Conclusion statement of reasonable assurance that the program is effective, or will be effective once created or enhanced to manage aging effects during the extended term of plant operation

FNP includes a discussion of the program elements only as applicable for the programs where an exception is being taken to NUREG-1801, when enhancements are being made, or when a program is plant-specific. For program enhancements or exceptions, FNP describes each element that is affected by the exception/enhancement, along with an explanation of how the exception/enhancement affects the element and why it is acceptable (if not already obvious from the description of the exception/enhancement).

For plant-specific programs, all ten program attributes described in NUREG-1800 are discussed.

B.1.3 DETERMINATION OF CONSISTENCY WITH NUREG-1801

SNC takes into consideration all NRC-approved Interim Staff Guidance (ISG) documents when determining program consistency with NUREG-1801. (See Section 2.1.5 of the LRA for a discussion of SNC's positions on specific ISGs). SNC conducted two types of comparisons to determine consistency with NUREG-1801, an Aging Management Program (AMP) comparison, and Aging Management Table comparison. The Aging Management Table comparisons are described in **Section 3.0.2**. The AMP comparisons are described below:

Aging Management Program Comparison:

This is a direct comparison of NUREG-1801, Vol. 2, Section X and XI program attributes against the FNP aging management program attributes (these 10 program attributes are defined in Appendix A of the SRP). The SNC interpretation is that consistency is defined primarily by intent. An aging management program (AMP) is deemed consistent with NUREG-1801 when:

- The AMP meets the intent of the NUREG-1801 AMP for the SSCs that credit the AMP for managing aging effects and,
- The key aspects of each attribute as described in NUREG-1801 can be or will be found within SNC processes and procedures.

Verbatim compliance for each attribute is not required; instead, engineering evaluation and judgment are used to determine consistency. Should minor differences exist, the FNP AMP is still considered consistent if it is determined that the differences do not substantially impact the key attributes. Differences that are determined to affect one or more key attributes, but are not judged to significantly alter the overall aging management program, are identified as exceptions. Such programs are classified as consistent with exceptions.

Differences in the scope of SSCs managed under the FNP AMP are not considered to render the FNP AMP inconsistent with NUREG-1801. The NUREG-1801 AMP may identify SSCs that are not within the scope of the equivalent FNP AMP(s) – e.g., these items may not exist at FNP or the aging effect(s) for these items may be managed by FNP under a different AMP or combination of AMPs. SNC may have chosen to package several GALL AMPs into a single AMP, or vice-versa without rendering the FNP AMP(s) inconsistent with NUREG-1801.

Use of a different edition/revision level/etc. for a code, standard, industry guidance document or similar reference is not sufficient to render an FNP AMP inconsistent with GALL, and it may or may not be considered an exception to the GALL AMP. Engineering evaluation and judgment is used to determine if the use of a different edition/revision level/etc. is significant in the determination of consistency with the GALL AMP. Use of different revisions can be considered acceptable and noted only as a clarification in most cases. For example, use of updated industry guidance documents that reflect improvements from lessons learned, recent operating experience and research results is considered part of ongoing program maintenance and therefore acceptable. Use of different versions of the ASME Section XI Code is controlled under the provisions of 10 CFR 50.55a for the current licensing basis and for the renewal term and therefore is judged to be not significant in the determination of consistency.

B.1.4 AGING MANAGEMENT PROGRAM QUALITY CONTROL ATTRIBUTES

The FNP Quality Assurance Program, which implements the requirements of 10 CFR 50, Appendix B, is consistent with the summary in Appendix A.2 of NUREG-1800. The FNP program includes the elements of corrective action, confirmation process, and administrative controls, as described below.

The FNP Quality Assurance Program controls are applicable to the systems, structures, and components that are subject to an aging management review (AMR) for license renewal.

B.1.4.1 Corrective Actions

FNP applies a single corrective actions process, regardless of the safety classification of the system, structure or component. Corrective actions are initiated in accordance with plant procedures established to implement 10 CFR 50, Appendix B.

FNP requires documentation of actual or potential problems including, but not limited to, unexpected plant equipment degradation, damage, failure, or malfunction. FNP will include in site implementing procedures for programs credited for aging management a statement requiring corrective action be initiated whenever appropriate criteria are not met.

B.1.4.2 Confirmation Process

The focus of the FNP confirmation process is formal follow-up actions that must be taken to verify effective implementation of corrective actions. Effectiveness is measured in terms of correcting the adverse condition and precluding repetition of significant conditions adverse to quality.

Plant procedures 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 (e.g., significant conditions adverse to quality). These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions have been implemented.

The corrective actions process is also monitored for potentially adverse trends. The existence of an adverse trend due to recurring or repetitive adverse conditions will result in the initiation of corrective actions.

B.1.4.3 Administrative Controls

FNP administrative controls require formal written procedures and other forms of administrative controls for the activities performed under the programs credited for managing aging during the renewal term. These FNP procedures contain or will contain objectives, program scope, responsibilities, methods for implementation, and acceptance criteria.

B.1.5 PROGRAM OPERATING EXPERIENCE

SNC reviewed industry and plant specific operating experience (OE) using formal license renewal procedures. The License Renewal staff conducted a review of industry documents, generic communications from the NRC, the FNP CR database, NRC inspection reports, inservice inspection reports and maintenance work orders. The License Renewal staff also interviewed system engineers, supervisors and subject matter experts to ensure that significant OE was captured. Formal operating experience reports were developed, where applicable.

The SNC OE review considered existing aging management programs, including the application of past corrective actions that resulted in program enhancements. No programmatic OE currently exists for new programs, but in some cases there is pertinent operating experience that relates to the new program. This review included, as a minimum, the last five years of FNP operating history.

SNC will evaluate and incorporate industry and plant specific OE into the new aging management programs during the period of extended operation.

The results of the SNC OE review for existing and enhanced programs provide objective evidence that the effects of aging have been and will continue to be managed during the renewal term.

B.1.6 FNP AGING MANAGEMENT PROGRAM CHARACTERIZATION

SNC credits the programs listed below for managing the effects of aging during the license renewal term. SNC presents programs as consistent, or consistent with certain exceptions, with the generic programs discussed in NUREG-1801. Plant-specific programs are those not specifically described in NUREG-1801. SNC further identifies programs as existing, enhanced or new.

B.1.6.1 Existing Programs

- Inservice Inspection Program (Including Subsections IWB, IWC, IWD, IWE, IWL and IWF) (**B.3.1**)
- Water Chemistry Control Program (**B.3.2**)
- Service Water Pond Dam Inspection Program (**B.3.3**)
- Reactor Vessel Surveillance Program (**B.3.4**)
- Borated Water Leakage Assessment and Evaluation Program (**B.3.5**)
- Overhead and Refueling Crane Inspection Program (**B.3.6**)
- Environmental Qualification Program [TLAA Management Program] (**B.3.7**)
- Steam Generator Program (**B.3.8**)

B.1.6.2 Enhanced Programs

- Flow-Accelerated Corrosion Program (**B.4.1**)
- Fuel Oil Chemistry Control Program (**B.4.2**)
- Structural Monitoring Program (**B.4.3**)
- Service Water Program (**B.4.4**)
- Fire Protection Program (**B.4.5**)

B.1.6.3 New Programs

- Reactor Vessel Internals Program (**B.5.1**)
- Flux Detector Thimble Inspection Program (**B.5.2**)
- External Surfaces Monitoring Program (**B.5.3**)
- Buried Piping and Tank Inspection Program (**B.5.4**)
- One-Time Inspection Program (**B.5.5**)
- Non-EQ Cables Program (**B.5.6**)
- Fatigue Monitoring Program [TLAA Management Program] (**B.5.7**)
- NiCrFe Component Assessment Program (**B.5.8**)

B.2.0 AGING MANAGEMENT PROGRAM CORRELATION TO NUREG-1801

The general correlation between aging management programs suggested in NUREG-1801 and the FNP programs is illustrated in **Table B.2-1**. Where applicable, references to appropriate sections of this appendix are provided.

Table B.2.0 Correlation between NUREG-1801 and FNP Programs

NUREG-1801 Chapter	NUREG-1801 Program	FNP Program
XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Inservice Inspection Program (**B.3.1**)
XI.M2	Water Chemistry	Water Chemistry Control Program (**B.3.2**)
XI.M3	Reactor Head Closure Studs	Inservice Inspection Program (**B.3.1**)
XI.M4	BWR Vessel ID Attachment Welds	Not applicable, FNP is a PWR.
XI.M5	BWR Feedwater Nozzle	
XI.M6	BWR Control Rod Drive Return Line Nozzle	
XI.M7	BWR Stress Corrosion Cracking	
XI.M8	BWR Penetrations	
XI.M9	BWR Vessel Internals	
XI.M10	Boric Acid Corrosion	Borated Water Leakage Assessment and Evaluation Program (**B.3.5**)
XI.M11	Nickel-Alloy Nozzles and Penetrations	Not credited for license renewal. Elements included in NiCrFe Component Assessment Program (**B.5.8**)
XI.M12	Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)	Inservice Inspection Program (**B.3.1**)

Table B.2.0 (cont'd) Correlation Between NUREG-1801 and FNP Programs

NUREG-1801 Chapter	NUREG-1801 Program	FNP Program
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Reactor Vessel Internals Program (**B.5.1**)
XI.M14	Loose Part Monitoring	Not credited for license renewal
XI.M15	Neutron Noise Monitoring	
XI.M16	PWR Vessel Internals	Reactor Vessel Internals Program (**B.5.1**)
XI.M17	Flow Accelerated Corrosion	Flow Accelerated Corrosion Program (**B.4.1**)
XI.M18	Bolting Integrity	Not credited for license renewal
XI.M19	Steam Generator Tube Integrity	Steam Generator Program (**B.3.8**)
XI.M20	Open-Cycle Cooling Water System	Service Water Program (**B.4.4**)
XI.M21	Closed-Cycle Cooling Water System	Water Chemistry Control Program (**B.3.2**)
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 Inspections (**B.3.6**)
XI.M24	Compressed Air Monitoring	Not credited for license renewal
XI.M25	BWR Reactor Water Cleanup System	Not applicable, FNP is a PWR.
XI.M26	Fire Protection	Fire Protection Program (**B.4.5**)
XI.M27	Fire Water System	

Table B.2.0 (cont'd) Correlation Between NUREG-1801 and FNP Programs

NUREG-1801 Chapter	NUREG-1801 Program	FNP Program
XI.M28	Buried Piping and Tanks Surveillance	Not credited for license renewal
XI.M29	Aboveground Carbon Steel Tanks	Not credited for license renewal
XI.M30	Fuel Oil Chemistry	Fuel Oil Chemistry Program (**B.4.2**)
XI.M31	Reactor Vessel Surveillance	Reactor Vessel Surveillance Program (**B.3.4**) (This is a plant-specific program per NUREG-1801)
XI.M32	One-time Inspection	One-Time Inspection Program (**B.5.5**)
XI.M33	Selective Leaching of Materials	
XI.M34	Buried Piping and Tanks Inspection	Buried Piping and Tank Inspection Program (**B.5.4**)
XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Non-EQ Cables Program (**B.5.6**)
XI.E2	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	
XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	
XI.S1	ASME Section XI, Subsection IWE	Inservice Inspection Program (**B.3.1**)
XI.S2	ASME Section XI, Subsection IWL	
XI.S3	ASME Section XI, Subsection IWF	

Table B.2.0 (cont'd)   Correlation Between NUREG-1801 And FNP Programs

NUREG-1801 Chapter	NUREG-1801 Program	FNP Program
XI.S4	10 CFR 50, Appendix J	
XI.S5	Masonry Wall Program	Structural Monitoring Program (**B.4.3**) (This is a plant-specific program per NUREG-1801)
XI.S6	Structures Monitoring Program	
XI.S7	RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants	Service Water Pond Dam Inspection Program (**B.3.3**)
XI.S8	Protective Coating Monitoring and Maintenance Program	Not credited for license renewal
X.M1	Metal Fatigue of Reactor Coolant Pressure Boundary	Fatigue Monitoring Program (**B.5.7**)
X.E1	Environmental Qualification (EQ) of Electrical Components	Environmental Qualification Program (**B.3.7**)
X.S1	Concrete Containment Tendon Pre-stress	Managed by TLAA
None	Plant Specific Programs (Note: These are FNP programs which have no corresponding NUREG-1801 equivalent program)	Flux Detector Thimble Inspection Program (**B.5.2**)
		NiCrFe Component Assessment Program (**B.5.8**)
		External Surfaces Monitoring Program (**B.5.3**)

B.3.0 EXISTING AGING MANAGEMENT PROGRAM DESCRIPTIONS

B.3.1 INSERVICE INSPECTION PROGRAM

By letter dated July 16, 2003, Southern Nuclear Operating Company (SNC) requested to use a Risk-Informed Inservice Inspection (RI-ISI) Program as an alternative to the FNP Units 1 and 2 ISI Program requirements for ASME Code Category B-F, B-J, C-F-1, and C-F-2 piping. Assuming this program change is approved, SNC will work closely with NRC to ensure changes to the CLB as reflected in this program change will be appropriately incorporated in the Inservice Inspection Program Aging Management Program described herein. The proposed alternative is based on the risk-informed process described in Westinghouse Owners Group (WOG) WCAP-14572, Revision 1-NP-A, “Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report,” and WCAP-14572, Revision 1-NP-A, Supplement 1, “Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection.”

B.3.1.1 Program Description

By Letter NEL-97-0251, dated May 28, 1997, SNC submitted the FNP Unit 1 and 2 ISI Programs in accordance with the requirements of 10 CFR 50.55a(g)(4)(ii). SNC updated the Code of Record for the ISI Program for Units 1 and 2 to the ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition (no addenda). 10 CFR 50.55a was amended in the Federal Register on August 8, 1996, to require the use of the ASME Section XI, 1992 Edition with the 1992 Addenda, when performing containment examinations. Consequently, the Code of Record for Subsection IWE and IWL containment examinations is ASME Section XI, 1992 Edition with the 1992 Addenda, as modified by specific requirements in 10CFR50.55a.

The FNP Inservice Inspection (ISI) Program is implemented in accordance with 10 CFR 50.55a, which imposes the inservice inspection requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, for Class 1, 2, and 3 (Subsections IWB/IWC/IWD) pressure-retaining components and their integral attachments, containment and integral attachments (Subsections IWE/IWL) and the applicable component supports (Subsection IWF). The program manages loss of material, cracking, change in material properties, loss of preload/stress relaxation, loss of fracture toughness, and change in strength in concrete.

The ASME Section XI, Subsections IWB, IWC, & IWD Inservice Inspection (ISI) Program inspections are performed to identify and correct degradation in Class 1, 2, and 3 pressure retaining components and their integral attachments. Subsection IWE and IWL inspections are performed to identify and correct degradation in containment steel and concrete, other containment pressure retaining components, and containment tendons. Subsection IWF inspections are performed to identify degradation in Class 1, 2 and 3 piping and other supports.

The IWB, IWC, IWD ISI program inspections includes periodic visual, surface and/or volumetric examinations and leakage tests of Class 1, 2 and 3 pressure-retaining components, and their integral attachments, including welds, pump casings, valve bodies, and pressure-retaining bolting. These components and their integral attachments are identified in ASME Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, or in commitments to augmented inservice inspections performed in accordance with ASME Section XI on components that are within the scope of License Renewal.

The IWE portion of the FNP ISI Program is consistent with ASME Section XI, Subsections IWE. Scope includes the containment liner including welds, base metal, pressure retaining bolting, seals, gaskets and moisture barriers.. The steel liner is also within the scope of license renewal. The liner plate and its integral attachments including welds and base metal are inspected in accordance with Subsection IWE. For Category E-P, the ISI Program uses the examination requirements, examination methods, acceptance standards and frequencies contained in 10 CFR 50, Appendix J.

The FNP IWL portion of the FNP ISI Program is consistent with ASME Section XI IWL. The IWL scope includes the reinforced concrete and unbonded post-tensioning systems of Class CC containments that are within the scope of license renewal for FNP. It should be noted that Subsection IWL exempts from examination portions of the concrete containment that are inaccessible such as that which is covered by the liner, foundation material, or obstructed by adjacent structures or components.

B.3.1.2 NUREG-1801 Consistency

The ASME Section XI, Inservice Inspection Program is an existing program that is consistent with the collection of acceptable ASME Section XI subprograms described collectively in NUREG-1801 Sections XI.M1, XI.M3, XI.M12, XI.S1, XI.S2, XI.S3, and XI.S4. The determination of those CASS components potentially susceptible to thermal aging embrittlement (NUREG 1801 Section XI.M12) is performed as part of the aging management reviews. The control of lubricants for reactor head closure studs as a preventive measure is incorporated into FNP maintenance practices.

B.3.1.3 Exceptions to NUREG-1801

None

B.3.1.4 Enhancements

None

B.3.1.5 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 in light-water cooled power plants. Some specific examples of industry operating experience of component degradation are included in NUREG-1801.

FNP reviewed plant-specific ASME Section XI, Inservice Inspection Program performance results from six unit outages. The results showed that the program has been effective in finding and correcting degradation attributable to aging effects requiring management. In addition, multiple instances were found where examinations had been performed to address industry operating experience at other plants.

B.3.1.6 Conclusion

There is reasonable assurance that the FNP Inservice Inspection Program will remain effective in managing aging effects including cracking, loss of material; and loss of mechanical closure integrity.

The continued implementation of the ASME Section XI, Subsections IWB, IWC, IWD, IWE, IWL and IWF of the FNP Inservice Inspection Program provides reasonable assurance that the aging effects will be managed such that the systems and 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.3.2 WATER CHEMISTRY CONTROL PROGRAM

B.3.2.1 Program Description

The FNP Water Chemistry Control Program will manage loss of material and cracking within system components and structures, thereby ensuring continued structural integrity, reliability, and availability. The program includes monitoring of detrimental species and addition of chemical additives. The program utilizes the EPRI water chemistry guidelines in establishing chemistry control procedures for FNP. These documents are updated as necessary to reflect improved guidance and industry experience. Prior to adopting a later revision, SNC evaluates the acceptability of any changes in implementing requirements.

The FNP Water Chemistry Control Program is credited for aging management of specific component/commodity groups in the following license renewal application systems and structures:

- Auxiliary Building (spent fuel pool)
- Auxiliary Feedwater System
- Auxiliary Steam and Condensate Recovery System
- Chemical and Volume Control System
- Closed Cycle Cooling Water System
- Containment Spray System
- Demineralized Water System
- Emergency Core Cooling System
- Emergency Diesel Generator
- Feedwater System
- Liquid Waste and Drains
- Main Steam System
- Open Cycle Cooling Water System (Service Water System)
- PWR Concrete Containment (transfer canal)
- Reactor Makeup Water Storage System
- Reactor Vessel
- Reactor Vessel Internals
- Reactor Coolant System and Connected Lines
- Sampling System
- Spent Fuel Cooling and Cleanup System
- Steam Generators
- Steam Generator Blowdown System

The FNP Water Chemistry Control Program is subdivided into primary, secondary and closed cooling water chemistry sections.

<u>Primary Water Chemistry</u>

Consistent with NUREG-1801, Section XI.M2, primary water chemistry control is based upon the guidance provided in the EPRI TR-105714, Volumes 1 and 2, “PWR Primary Water Chemistry Guidelines.”

Secondary Water Chemistry

Consistent with NUREG-1801, Section XI.M2, secondary water chemistry control is based upon the guidance provided by the EPRI TR-102134, “PWR Secondary Water Chemistry Guidelines.”

Closed Cycle Cooling Water Chemistry

Consistent with NUREG-1801, Section XI.M21, closed cooling water chemistry control is based upon the guidance provided by EPRI TR-107396, “Closed Cooling Water Chemistry Guideline.”

B.3.2.2 NUREG-1801 Consistency

SNC views the use of later revisions of the EPRI water chemistry guidelines as consistent with the NUREG-1801 philosophy of incorporating industry and plant specific operating experience into aging management programs. Primary water chemistry control is currently based on Rev. 4 of EPRI TR-105714, Volumes 1 and 2. Secondary water chemistry control is currently based on Rev. 5 of EPRI TR-102134. Closed cooling water chemistry control is currently based on the original issue of EPRI TR-107396. Program changes associated with updates to these guidelines are evaluated for acceptability prior to incorporation.

The FNP primary and secondary chemistry monitoring and control methods are consistent with those described in NUREG-1801, Section XI.M2.

With one exception as noted below, the FNP closed cycle cooling water monitoring and chemistry control methods are consistent with those described in NUREG-1801 sections XI.M21.

B.3.2.3 Exceptions to NUREG-1801

The Closed Cycle Cooling Water program described in NUREG-1801, section XI.M21 places emphasis on thermal-hydraulic performance testing for pumps and heat exchangers. The FNP program deals with performance monitoring as outlined in Section 5 of EPRI TR-107396, “Closed Cooling Water Chemistry Guideline” regarding chemistry monitoring.

B.3.2.4 Enhancements

None

B.3.2.5 Operating Experience

The FNP Water Chemistry Program incorporates the best practices of industry organizations, vendors, and utilities.

The operating experience review for the water chemistry program indicated that most condition reports dealt with relatively minor instances of chemistry parameters outside of specified limits. In these cases, prompt corrective actions were taken to restore water chemistry parameters within acceptable limits.

The results of self-assessments have been incorporated into the FNP program. These assessments have resulted in improvements in the program in the areas of chemical treatment methods, visual inspection planning, and trending capabilities.

B.3.2.6 Conclusion

The FNP Water Chemistry Control Program will provide reasonable assurance that the structural integrity of primary, secondary and closed cooling water system components, including system pressure boundaries, will be maintained during the period of extended operation.

B.3.3 SERVICE WATER POND DAM INSPECTION PROGRAM

B.3.3.1 Program Description

The service water pond dam and spillway are inspected on a periodic basis in accordance with NRC Regulatory Guide (RG) 1.127, rev. 1, "Inspection of Water-Control Structures Associated with Nuclear Power Plants." The service water pond dam inspection performed in accordance with RG 1.127 is an acceptable basis for in-service inspection and surveillance of the dam and its associated slopes and spillway.

The FNP Service Water Pond Dam Inspection Program addresses age-related deterioration, degradation due to environmental conditions, and the effects of natural phenomena that may affect water-control structures. Periodic monitoring of water-control structures ensures that the consequences of age-related deterioration and degradation can be detected and mitigated in a timely manner.

The service water pond dam inspection(s) include the earthen dam, the service water pond embankments and the spillway slopes. Parameters monitored and inspected for the earthen embankment of the service water pond dam include settlement, depressions, sink holes, slope stability (e.g., irregularities in alignment and variance from originally constructed slopes), seepage, proper functioning drains, and degradation of slope protection features. Visual inspection is the primary means of detecting degradation of the service water pond dam.

B.3.3.2 NUREG-1801 Consistency

The Service Water Pond Dam Inspection Program is a monitoring and inspection program consistent with NUREG-1801, Section XI.S7.

B.3.3.3 Exceptions to NUREG-1801

None

B.3.3.4 Enhancements

None

B.3.3.5 Operating Experience

The FNP program provides for biennial inspections conducted under FNP procedures using FNP acceptance criteria. A review of condition reports, supported by interviews, revealed that minor problems with vegetation, etc. have been detected. A recent example included some vegetation growth and some ant beds being found on the earthen dam structure in the rip-rap. These results were captured under the Corrective Action Program and action initiated to correct these items.

B.3.3.6 Conclusion

The periodic performance of the Service Water Pond Dam Inspection Program will uncover conditions adverse to quality and adequately monitor the integrity of the service water pond dam, its embankments, and spillway through the period of extended operation.

B.3.4 REACTOR VESSEL SURVEILLANCE PROGRAM

B.3.4.1 Program Description

The Reactor Vessel Surveillance Program (RVSP) is a condition monitoring program which predicts changes in reactor vessel beltline material fracture toughness. The program evaluates neutron embrittlement through surveillance capsule testing and evaluation, fluence calculations and benchmarking, and monitoring of effective full power years (EFPYs). For fluence calculations, FNP uses Regulatory Guide 1.190 which provides for a "best estimate" fluence calculation.

B.3.4.2 NUREG-1801 Consistency

NUREG-1801, Section XI.M31, describes the attributes of an acceptable reactor vessel material surveillance program. However, the NRC indicates that reactor vessel surveillance programs are plant specific, depending on matters such as composition of the limiting materials, availability of surveillance capsules and projected fluence levels.

NUREG-1801 presents this program differently from most other programs contained in Chapter XI. Instead of addressing the ten attributes described in BTP RLSB-1, Section XI.M31 of NUREG-1801 provides a list of eight (8) items that constitute an acceptable surveillance program (as opposed to 10 attributes). Therefore, the FNP RVSP is presented as a plant specific program evaluated against the 10 aging management attributes contained in Branch Technical Position (BTP) RLSB-1.

FNP conducted a specific assessment of the FNP RVSP against the eight items listed in NUREG-1801, Section XI.M31. The FNP program is in agreement with NUREG-1801, with one exception.

B.3.4.3 Exception to NUREG-1801

The singular exception to the eight (8) acceptable program items described in NUREG-1801 relates to SNC's proposed surveillance capsule removal schedule. NUREG-1801 specifies that all remaining surveillance capsules are to be removed at a 60-year fluence and alternate dosimetry installed. For FNP Unit 1, SNC has removed one capsule at a fluence approximately equivalent to 60 years. For FNP Unit 2, SNC will remove one capsule at a fluence approximately equivalent to 60 years. For each unit, one capsule will remain in the reactor vessel until a fluence of approximately 80-years.

B.3.4.4 Enhancements

None

B.3.4.5 Program Scope

The scope of the program addresses all reactor vessel beltline materials, including the RPV lower and intermediate shell plates, longitudinal welds, and circumferential welds.

B.3.4.6 Preventive Actions

The RVSP is a condition monitoring program. There are no preventive or mitigative actions associated with this program.

B.3.4.7 Parameters Inspected or Monitored

The objective of the RVSP is to periodically monitor and project reductions in the fracture toughness of reactor vessel beltline materials. Reductions in fracture toughness due to neutron embrittlement are manifested as a reduction of the upper-shelf energy (USE) and an increase in the reference temperature (RT_{NDT}). Changes in these properties will also result in changes to the predicted pressurized thermal shock reference temperature (RT_{PTS}) values and pressure-temperature limitations.

B.3.4.8 Detection of Aging Effects

The RVSP detects and projects reductions in reactor vessel beltline material fracture toughness such that no loss of the reactor vessel intended functions occurs.

B.3.4.9 Monitoring and Trending

The RVSP monitors and trends predicted changes in vessel beltline material fracture toughness properties. Re-evaluation is performed whenever new surveillance capsule data becomes available or when changes in operating parameters occur that may affect end of life predictions of fracture toughness. Unit EFPYs are also monitored.

B.3.4.10 Acceptance Criteria

Upper shelf energy (USE) values predicted from evaluation of Charpy V-notch specimens and per Regulatory Guide 1.99 methodologies comply with the requirements of 10 CFR 50 Appendix G.

Acceptable pressure-temperature limitations are maintained in accordance with the requirements of 10 CFR 50 Appendix G and ASME Section XI, Appendix G.

The reference temperatures for pressurized thermal shock (RT_{PTS}) meet the pressurized thermal shock screening criteria of 270 °F for plates, forgings, and axial weld materials, and 300 °F for circumferential weld materials.

Acceptable pressure-temperature limitations are maintained in accordance with the requirements of 10 CFR 50 Appendix G and ASME Section XI, Appendix G. Capsule removal and analysis is performed consistent with the requirements of 10 CFR 50 Appendix H.

B.3.4.11 Corrective Actions

Corrective actions are consistent with the requirements of 10 CFR 50 Appendix H, 10 CFR 50 Appendix G, FNP Technical Specifications, and NRC commitments. Corrective actions are addressed specifically by the FNP Corrective Actions Program.

B.3.4.12 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.3.4.13 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.3.4.14 Operating Experience

FNP surveillance specimens have been withdrawn and tested in the past, and the data from these surveillance capsules and data from other industry sources has been used to verify and predict the performance of the FNP reactor vessel beltline materials with respect to neutron embrittlement.

B.3.4.15 Conclusion

The Reactor Vessel Surveillance Program will be maintained in compliance with the requirements of 10 CFR Part 50, Appendix H, with NRC approved exceptions.

B.3.5 BORATED WATER LEAKAGE ASSESSMENT AND EVALUATION PROGRAM

B.3.5.1 Program Description

The FNP Borated Water Leakage Assessment and Evaluation program implements the plant-specific commitments made in response to Nuclear Regulatory Commission (NRC) Generic Letter (GL) 88-05. The FNP Borated Water Leakage Assessment and Evaluation program manages loss of material in areas where there are carbon steel and low-alloy steel structures or components, or electrical components, on which borated reactor water might leak. Special attention is given to areas where there are insulated Class 1 bolted closures.

B.3.5.2 NUREG-1801 Consistency

Consistent with GALL Section XI.M10, the FNP program includes (a) determination of the principal location of leakage, (b) examination requirements and procedures for locating small leaks, and (c) engineering evaluations and corrective actions to ensure that boric acid corrosion does not lead to degradation of the leakage source or adjacent structures or components, which could cause the loss of intended function of the structures or components.

B.3.5.3 Exceptions to NUREG-1801

None

B.3.5.4 Enhancements

None

B.3.5.5 Operating Experience

Industry experience shows that boric acid corrosion has been observed in nuclear power plants. Boric acid corrosion has been found to be most active where the metal surface is cooled enough to become wetted. Dry surfaces tend to slow the corrosion rate. Experience has shown that even relatively hot metal can be sufficiently cooled on the surface by the flow of leakage so that the surface stays wetted and boric acid corrosion is promoted. In addition, periods during which a metal surface is below normal operating temperature may allow corrosion in areas that would not otherwise be expected. Boric acid corrosion rates in excess of one (1) inch depth per year in ferritic steels have been experienced where low quality steam from borated reactor coolant impinged on a surface and kept it wetted.

FNP has steadily improved the borated water leakage assessment and evaluation program. In late 1988, plant procedures were revised to improve documentation of the inspections, require that the leakage paths to be determined and documented and to provide guidelines for conducting examinations and evaluations to establish the effects of boric acid leakage on the reactor coolant pressure boundary. In 1997, administrative controls were improved to provide more comprehensive guidance for the overall borated water leakage assessment, and to combine several previously disjoined efforts. The following year, guidance was added to provide a more descriptive scope, a more accurate process description and a more logical flow to the screening process. A note was added to distinguish leak resolution guidelines for containment versus leak resolution for the auxiliary building.

Operating experience has demonstrated that wet or dry boric acid leakage is discovered and investigated, no loss of intended function occurs, and corrective actions are performed.

B.3.5.6 Conclusion

The existing FNP Borated Water Leakage Assessment and Evaluation Program will ensure that any aging effects due to borated water leakage on carbon steel and low-alloy steel structures or components within the scope of license renewal will be adequately managed during the extended period of operation.

B.3.6 OVERHEAD AND REFUELING CRANE INSPECTION PROGRAM

B.3.6.1 Program Description

The FNP Overhead and Refueling Crane Inspection Program manages the effects of general corrosion of the crane bridge and trolley structural girders and beams and the crane rails and support girders for the spent fuel bridge cranes, spent fuel cask cranes, and the containment polar cranes. The contacting surfaces of the steel rails of these components are periodically inspected in accordance with plant procedures.

B.3.6.2 NUREG-1801 Consistency

This program is a monitoring and inspection program implemented in a manner consistent with NUREG-1801, Section XI.M23.

B.3.6.3 Exceptions to NUREG-1801

None

B.3.6.4 Enhancements

None

B.3.6.5 Operating Experience

The operating history review 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.

B.3.6.6 Conclusion

Continued implementation of the FNP 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.3.7 ENVIRONMENTAL QUALIFICATION PROGRAM

B.3.7.1 Program Description

The Environmental Qualification (EQ) Program manages component thermal, radiation and cyclical aging, as applicable, through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. 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.

Aging evaluations for EQ components that specify a qualification of at least 40 years are considered TLAAs for license renewal. The EQ Program ensures that these EQ components are maintained within the bounds of their qualification bases.

B.3.7.2 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.

B.3.7.3 Exceptions to NUREG-1801

None

B.3.7.4 Enhancements

None

B.3.7.5 Operating Experience

FNP has made significant improvements to the EQ program since its inception, with the most significant improvements coming in the form of a major program reconstitution effort in the late 1980’s. Program documentation including the EQ Packages have been maintained and periodically updated.

B.3.7.6 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.3.8 STEAM GENERATOR PROGRAM

B.3.8.1 Program Description

The FNP Steam Generator Program is based upon NEI 97-06, "Steam Generator Program Guidelines," which provide for detecting flaws in tubing and secondary side internals degradation. FNP uses the existing Steam Generator Program to perform replacement steam generator surveillance in accordance with the Technical Specifications.

B.3.8.2 NUREG-1801 Consistency

The FNP program is consistent with the program described in NUREG-1801, Section XI.M19.

B.3.8.3 Exceptions to NUREG-1801

None

B.3.8.4 Enhancements

None

B.3.8.5 Operating Experience

FNP recently replaced the original Westinghouse Model 51 steam generators with Westinghouse Model 54F replacement steam generators. The Unit 1 replacement steam generators were installed in May of 2000. The Unit 2 replacement steam generators were installed in May of 2001. No degradation of the replacement steam generators has been detected.

Westinghouse Model 54F steam generators incorporate several improvements over the original Model 51 steam generators including thermally treated Alloy 690 tubes (A690TT). SNC has not identified instances of cracking of A690TT tubes or sleeves at any U.S. plant. The only indications of any type of tube degradation of A690TT tubes have been wear-related, either as a result of loose parts or at tube support structures.

SNC has voluntarily committed to implement a SG degradation management program based upon that described in the Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines." FNP will update the Steam Generator Program as required to incorporate changes to NEI 97-06 and EPRI guidelines for steam generators. Ultimately, steam generator degradation will be evaluated against the structural integrity and leakage performance criteria contained within NEI 97-06.

B.3.8.6 Conclusion

FNP has replaced the steam generators on both units. The combination of the new steam generators, the existing management program and the commitment to voluntarily comply with NEI 97-06 provide reasonable assurance that steam generator components within the scope of license renewal will continue to perform their intended functions during the period of extended operation.

B.4.0 ENHANCED AGING MANAGEMENT PROGRAM DESCRIPTIONS

B.4.1 FLOW ACCELERATED CORROSION PROGRAM

B.4.1.1 Program Description

Flow Accelerated Corrosion (FAC) Program activities at FNP include analysis to determine susceptible locations, baseline inspections of wall thickness, follow up inspections and predictive modeling techniques. These activities provide reasonable assurance that loss of material will be managed such that these systems will perform their intended function(s) during the period of extended operation.

The FNP FAC program is credited for managing loss of material due to FAC for specific component/commodity groups in the auxiliary steam and condensate, feedwater, main steam and steam generator blowdown LRA systems.

B.4.1.2 NUREG-1801 Consistency

There are scope differences between the FNP program scope and the associated program scope presented in NUREG-1801. NUREG-1801 does not address the AFW turbine exhaust piping. NUREG-1801 discusses steam generator feedwater and steam nozzle safe ends, but these nozzles at FNP do not have safe ends. Finally, FNP has determined that the replacement steam generator steam nozzles are not FAC susceptible. Other than these scope differences, the FNP FAC Program is consistent with that described in NUREG-1801, Section XI.M17.

B.4.1.3 Exceptions to NUREG-1801

None

B.4.1.4 Enhancements

The auxiliary feedwater pump turbine exhaust piping will be added to the scope of the FAC Program prior to the period of extended operation.

B.4.1.5 Operating Experience

Operating experience shows that properly implemented FAC programs are effective in managing FAC in high-energy carbon steel piping and components. As evidenced by inspection reports for FNP, NRC has consistently found that the FNP program is effective in maintaining high-energy carbon steel piping within acceptable wall thickness limits.

Recent operating history was captured when the FNP Engineering Support Department evaluated the plant specific FAC operating experience for the FNP feedwater system against IN 2001-09. Through 1R17 (Fall 2001) 74 points in the Unit 1 feedwater system had been examined. Through 2R15 (Fall 2002) 82 points in the Unit 2 feedwater system had been examined. Based upon recent examinations, approximately eight (8) components were scheduled for replacement on Unit 1 during 1R18, and approximately 25 feet of piping in the Turbine Building and one component in the Main Steam Valve Room have been recommended for replacement during 2R16 for Unit 2.

B.4.1.6 Conclusion

The overall operating history of the FNP FAC Program, coupled with the enhanced program scope, provides reasonable assurance that 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.4.2 FUEL OIL CHEMISTRY CONTROL PROGRAM

B.4.2.1 Program Description

The FNP Fuel Oil Chemistry Program is governed by Technical Specifications. It includes surveillance and maintenance procedures to mitigate corrosion as well as measures to verify the effectiveness of this aging management program and confirm the absence of an aging effect. The program manages loss of material from the emergency diesel fuel oil system components.

In addition, FNP minimizes exposure to fuel oil contaminants, such as water and microbiological organisms, by verifying the quality of new oil before its introduction into the storage tanks.

Fuel oil quality is maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines contained in selected American Society for Testing Materials (ASTM) Standards. Chemical treatment is used to stabilize the fuel oil.

B.4.2.2 NUREG-1801 Consistency

Except as noted below, the elements of the FNP Fuel Oil Chemistry Program are consistent with those described in NUREG-1801, Section M.30.

B.4.2.3 Exceptions to NUREG-1801

The specific ASTM Standards that FNP uses as guidelines for sampling and sample analysis are governed by the plant Technical Specifications. These differ from those cited in NUREG-1801, Section XI.M30. A comparison of the standards cited in the plant Technical Specifications and procedures against the standards cited in NUREG-1801, Section XI.M30 was performed.

The FNP Program performs water, sediment, and viscosity analyses. FNP does not credit particulate analysis of fuel oil for aging management. Particulate analysis is performed on diesel fuel to address diesel performance concerns (i.e. filter clogging) and does not have a significant impact on pressure boundary integrity.

Since the parameters important to corrosion are monitored by the FNP Program, no significant difference exists in the ability of the program to manage aging effects. Operating experience confirms that the FNP Fuel Oil Chemistry Program has been effective in managing aging.

B.4.2.4 Enhancements

SNC will evaluate the scope of the program, and the need to improve procedural guidance for maintaining and monitoring the diesel driven fire pump fuel oil system. If changes are necessary, SNC will implement the changes prior to the period of extended operation.

B.4.2.5 Operating Experience

FNP has recently performed visual inspections of several emergency diesel generator fuel oil storage tanks. The overall condition of the tanks was satisfactory and showed no significant degradation, however some minimal loss of material was noted in a small area on one tank bottom. Thickness measurements were taken and confirmed the loss of material was insignificant and that the minimum wall thickness will not be threatened during the period of extended operation.

During the operating experience review for license renewal, SNC noted that NRC IN 2002-7 had been issued to inform licensees of the potential hazards of using sodium hypochlorite to clean diesel fuel oil tanks. FNP procedures prohibit the use of sodium hypochlorite.

B.4.2.6 Conclusion

Operating experience shows that the current Fuel Oil Chemistry Program is effective in preventing or mitigating loss of material from the interior of the emergency diesel generator storage tanks. Therefore, continuation of this program coupled with the enhancements described above, will provide reasonable assurance that the intended functions of the applicable components will be maintained during the period of extended operation.

B.4.3 STRUCTURAL MONITORING PROGRAM

B.4.3.1 Program Description

The FNP Structural Monitoring Program (SMP) is based upon the requirements and guidance set forth in 10 CFR 50.65 and Regulatory Guide (RG) 1.160, Rev. 2. FNP 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.

FNP also includes under the SMP the masonry wall considerations identified in NRC IE Bulletin (IEB) 80-11 and NRC Information Notice (IN) 87-67. FNP has implemented plant-specific condition monitoring of masonry walls to ensure that the evaluation basis developed in response to NRC IEB 80-11 is not invalidated by deterioration of the masonry walls.

B.4.3.2 NUREG-1801 Consistency

The FNP Structural Monitoring Program is consistent with the attributes described in NUREG-1801, Sections XI.S5 and XI.S6. It includes monitoring of masonry block walls as well as other important structures through implementation of a stepped, condition-appraisal process. This process is based on guidance provided in Regulatory Guide 1.160, Rev. 2, and meets the intent of the 10 criteria described in NUREG-1801 Sections XI.S5 and XI.S6. NUREG-1801 Section XI.S6 states structures monitoring programs are licensee-specific, therefore the FNP Structural Monitoring Program is presented in the plant-specific program format (discussion of all 10 program attributes described in NUREG-1800) for the purpose of staff review.

B.4.3.3 Exceptions to NUREG-1801

None

B.4.3.4 Enhancements

The FNP Structural Monitoring Program will be enhanced to include provisions to monitor structures and components during the period of extended operation which are in scope for license renewal but are not currently monitored under the program. These additional structures and components include:

- submerged portions of the Service Water Intake Structure (SWIS),
- in-scope support features for ATWS, SBO, and fire protection safe shutdown equipment in the Turbine Building,
- structural portions of the Oil Static Pump House,
- in-scope components in the Low Level Radwaste Building and Solidification/Dewatering Building (e.g., fire protection).

An enhancement will be made to the Structural Monitoring Program document to clarify the hangers and supports to be inspected in Category I buildings.

B.4.3.5 Program Scope

The FNP Structural Monitoring Program is credited for aging management of in-scope structure and support components in the following structures:

- Containment
- Auxiliary Building
- Service Water Intake Structure
- Diesel Generator Building
- Low Voltage Switchyard
- Fire Protection Pump House
- Switch House
- Turbine Building
- High Voltage Switchyard
- Valve and Pull Boxes
- Foundations, retaining walls and supports for the RWST, RMWST, Fire Water Tank, Fire Protection Fuel Oil Tank, Diesel Fuel Oil Storage Tank, and CST (tanks themselves are covered under other programs)
- Utility/Piping Tunnels
- Vent Stack
- Low Level Radwaste Storage Building
- Solidification/Dewatering Facility

B.4.3.6 Preventive Actions

The FNP program is comprised of condition monitoring activities. There are no preventive actions credited for the period of extended operation.

B.4.3.7 Parameters Inspected or Monitored

Concrete structures are inspected for cracking, spalling, radiation/temperature damage and signs of leaching, weathering and settlement. Masonry block walls are inspected for cracking and settlement. Steel structures and components are inspected for corrosion, cracked welds, deformation and degradation of grout and anchorage. Seismic gaps are inspected for deterioration and proper gap spacing.

B.4.3.8 Detection of Aging Effects

The SMP inspection process assesses the ongoing, overall conditions of the buildings and structures, and identifies any ongoing degradation. Structural condition is assessed through visual inspection. Inspections include those normally accessible buildings and structures, including accessible portions that are below ground or embedded. When normally inaccessible portions of structures are exposed because of excavation or modification, an examination of the exposed surfaces is performed. Structures are monitored for changes in previously identified findings and for newly developed conditions. Trending of such findings is performed to predict degrading conditions and to determine the potential long-term impact of the finding.

The inspection frequency for plant structures varies according site conditions and susceptibility to aging degradation. Structures monitored under the provisions of 10 CFR 50.65 (a) (2) are inspected at regular intervals unless the conditions environment, or noted degradation warrants changes to inspection frequency. For portions of buildings and structures that are normally inaccessible due to physical obstruction or that are below grade, inspections are performed whenever these areas are excavated or exposed.

B.4.3.9 Monitoring and Trending

Initial inspections (baseline) were conducted to facilitate condition trending. The SMP reports indicate that baseline inspections were conducted during the period of June 1996 through August 1997 for the structures and structural components described in the SMP program document. The primary purpose of the Baseline Inspections was to determine signs of active degradation mechanisms and provide an initial assessment of their significance, and establish a reference baseline (in time) for comparison to future inspection results.

Structures are monitored for changes from previously identified findings and for newly developed conditions. Trending of such findings is performed to predict degrading conditions and to determine the potential long-term impact of the finding. Periodic inspections commenced in April 2000 and are planned every 5 years for the duration of plant operation. This frequency is subject to modification based on plant specific environments or observed degradation. Such observations may dictate that an increased or decreased inspection rate would be prudent for a particular structure or structural component.

B.4.3.10 Acceptance Criteria

Acceptance criteria for inspection and criteria for categorizing the overall Structural and component conditions (i.e., acceptable, acceptable with deficiency, or unacceptable) are provided in plant procedures. The acceptance criteria are consistent with the recommended criteria in ACI-349.3R-1996, but also include additional criteria for roofing, water leakage, coatings, and penetration seals. (Note: Protective coatings are not relied upon to manage the effects of aging for any structural component in the scope of License Renewal.) The results of the inspections are evaluated in accordance with the guidance given in NEI-96-03 and NRC Regulatory Guide 1.160. The FNP SMP contains the detailed acceptance criteria.

B.4.3.11 Corrective Actions

Structures or structural components that are identified as “Acceptable with Deficiencies” or “Unacceptable” are evaluated by engineering to determine the appropriate corrective action(s). As discussed in the appendix to NUREG-1801, FNP considers continued compliance with the requirements of 10CFR 50, Appendix B, acceptable to address corrective actions.

B.4.3.12 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.4.3.13 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.4.3.14 Operating Experience

A formal operating experience program is in place at FNP, and improvements have been made to the SMP. Plant specific operating experience is derived from condition report searches, personnel interviews and SMP inspection report reviews.

The Baseline Inspections conducted during the period of June 1996 through August 1997 established a reference in time for comparison to future inspections. Periodic inspections commenced in April 2000 and are planned every 5 years for the duration of plant operation. The periodic inspections that were conducted during the first 5-year period included all accessible areas in the scope of the SMP.

The operating experience review has concluded that administrative controls are in effect and effective in identifying age related degradation and initiating corrective action.

B.4.3.15 Conclusion

The continuation of the existing FNP Structural Monitoring Program inspections and reporting, together with the enhancement 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.4.4 SERVICE WATER PROGRAM

B.4.4.1 Program Description

The FNP Service Water (SW) Program activities implement the recommendations of Nuclear Regulatory Commission (NRC) Generic Letter (GL) 89-13. Program activities include mitigation, as well as performance and condition monitoring techniques that manage fouling and loss of material in the SW system and associated components.

Prevention or mitigation of fouling and loss of material in the SW systems and components is accomplished, in part, by intermittent injection of appropriate water treatment chemicals. Other preventive aspects of the FNP service water program include periodic flushing of low flow and stagnant lines to mitigate or prevent fouling, and heat exchanger cleaning at regular intervals. Volumetric examination may be used to detect pipe wall thinning. Some components are visually inspected for fouling or loss of material.

B.4.4.2 NUREG-1801 Consistency

The FNP Service Water Program is consistent with the aging management program described in NUREG-1801, Section XI.M20.

B.4.4.3 Exceptions to NUREG-1801

None

B.4.4.4 Enhancements

The scope of the Service Water Program will be enhanced prior to the extended period of operation to include inspection of piping from the main service water header to the air compressor credited for Appendix R safe shutdown and the service water pump columns.

B.4.4.5 Operating Experience

Program inspections and plant observations have revealed some instances of local loss of material, much of it in stagnant sections of piping. There has also been evidence of loss of material in the containment cooler, CCW, and diesel generator heat exchangers. Corrective actions were taken.

Fouling was found to have occurred, including biofouling (live clams). Corrective actions included procedure revisions and an engineering evaluation to determine flushing needs. Evidence of MIC continues to be found without severe problems or loss of function.

B.4.4.6 Conclusion

The continuation of the existing Service Water Program will provide reasonable assurance that the service water structures and components will continue to perform their intended function(s) during the period of extended operation.

B.4.5 FIRE PROTECTION PROGRAM

B.4.5.1 Program Description

FNP's Fire Protection Program will provide inspections, performance testing and monitoring, and aging management activities during the period of extended operation for water and gas based fire protection systems, fire dampers, fire doors, fire penetration seals, cable wrap and fire pump diesels (including the external surfaces of exposed fuel oil piping). This program will detect loss of material, fouling, cracking, and change in material properties (CO_2 tank insulation) in the applicable fire protection components.

Visual inspections and/or performance testing and monitoring will be performed on fire protection components requiring aging management during the period of extended operation. For example, fire pump diesels will be periodically performance tested and fire doors will be inspected to ensure their operability is maintained.

Structural fire barriers, including fire walls, floors, ceilings, structural portions of fire penetration seals, and fire door frames will be inspected and age managed during the period of extended operation separately from the Fire Protection Program by the Structural Monitoring Program.

The fire pump diesel fuel oil quality will be tested and verified by the Fuel Oil Chemistry Control Program.

B.4.5.2 NUREG-1801 Consistency

Considering the enhancements discussed below, the FNP aging management programs for the fire protection system are consistent with those described in NUREG-1801, Sections XI.M26 and XI.M27, and the changes thereto presented in the NRC Interim Staff Guidance (ISG)-04, Aging Management of Fire Protection Systems for License Renewal.

B.4.5.3 Exceptions to NUREG-1801

None

B.4.5.4 Enhancements

The FNP Fire Protection Program will be enhanced prior to entering the period of extended operation (with the exception of sprinkler head testing which will be implemented prior to 50 years of fire protection system service) through the use of administrative controls and procedures as follows:

- The fire protection sprinkler system piping will be subjected to wall thickness evaluations (e.g., non-intrusive volumetric testing and/or visual inspections during plant maintenance) prior to the period of extended operation and at specific intervals thereafter. The plant-specific inspection interval will be established from the initial inspection results and revised as appropriate for subsequent inspection results.

- A sample of sprinkler heads will be inspected by using the guidance of National Fire Protection Association (NFPA) 25 (2002), Section 5.3.1.1.1, at or before 50 years service and every 10 years thereafter.

- Diesel driven fire pump surveillance procedures will be upgraded to provide more detailed instructions related to inspection of the fuel oil supply piping.

- The current practice of replacing CO_2 hoses at 5 year intervals will be formalized in fire protection procedures.

B.4.5.5 Operating Experience

Since the inception of the Fire Protection Program, ongoing internal and external assessments have been performed, including NRC triennial inspections. These assessments have been effective in identifying programmatic strengths and weaknesses and prompting corrective actions. Inspections, performance testing and performance monitoring per the existing Fire Protection Program has been effective at managing age-related degradation such that corrective actions are taken well before a loss of intended function could occur.

Specific operating experience indicates that there have been occasions where loss of material occurred along the bottom of specific sections of normally dry fire protection piping. Interviews indicated that this was attributed to drainage problems associated with operational or design/installation practice, and corrective actions have been taken to prevent recurrence.

With regard to the carbon dioxide system, a review was conducted which covered approximately 15 years of operation. The results indicated very few age related instances requiring maintenance. Most of the item involved replacement of bulbs, valve seals, rubber seats, and pilot valve seat discs.

The existing Fire Protection Program at FNP has been effective in discovering, identifying, and correcting aging issues in fire protection system components before the loss of intended function could occur.

B.4.5.6 Conclusion

The continuation of the existing Fire Protection Program will provide reasonable assurance that the fire protection structures and components will continue to perform their intended function(s) during the period of extended operation.

B.5.0 NEW AGING MANAGEMENT PROGRAM DESCRIPTIONS

B.5.1 REACTOR VESSEL INTERNALS PROGRAM

B.5.1.1 Program Description

The new FNP Reactor Vessel Internals Program will be an integrated inspection program that addresses the reactor internals. It is intended to supplement the inspection requirements of ASME Section XI, IWB Category B-N-3 to ensure that aging effects do not result in a loss of intended function of internal components during the period of extended operation.

The Reactor Vessel Internals Inspection Program manages the effects of crack initiation and growth due to irradiation assisted stress corrosion cracking; loss of fracture toughness due to irradiation embrittlement, thermal embrittlement, or void swelling; or changes in material properties (dimension) due to void swelling.

While subject to change based on the results of ongoing industry research, accessible areas of the following Reactor Vessel Internals components will be included in the visual examination scope:

- Baffle and Former Assemblies
- Bottom Mounted Instrumentation Column Cruciforms (casting)
- Core Barrel
- Lower Core Plate and Fuel Alignment Pins
- Lower Support Forging
- Upper Support Column Bases (casting)

SNC supports development of improved industry data, models, and inspection methodologies through active participation in the EPRI Materials Reliability Program Reactor Vessel Internals Issue Task Group and the Westinghouse Owners Group.

B.5.1.2 NUREG-1801 Consistency

The FNP Reactor Vessel Internals Program will be consistent with exceptions as compared to NUREG-1801, Sections XI.M13 and XI.M16. See the exceptions to NUREG-1801 detailed below.

B.5.1.3 Exceptions to NUREG-1801

Based on the recent replacement of selected FNP baffle bolting with an improved bolt design and a lack of data regarding the effectiveness of ultrasonic examinations, FNP takes exception to the requirement for ultrasonic examination of baffle bolting. FNP will perform VT-1 of these connections. Additionally, SNC will continue to participate in industry activities coordinated by the WOG and MRP and will update this inspection program as appropriate based on the results of future research initiatives.

FNP will limit VT-1 and enhanced VT-1 inspections to those leading locations as determined by industry research and operating experience.

The new inspection program will not follow the inspection cycles set forth in ASME Section XI IWB. A baseline inspection of the FNP internals will be performed during the 5th ISI inspection interval. The frequency of subsequent inspections, and the inspection methodologies utilized, will be based on the results of the baseline inspections.

The FNP Reactor Vessels Internals Program may contain additional inspection requirements and acceptance criteria to detect changes in critical reactor internals dimensions due to void swelling. These inspection requirements and acceptance criteria will be based upon the results of ongoing industry research regarding the significance of void swelling in the PWR environment.

B.5.1.4 Enhancements

None

B.5.1.5 Operating Experience

This is a new program. Accordingly, there is no programmatic history. However, there is operating history related to the vessel internals themselves. For example, based upon industry operating experience, FNP will replace the Unit 2 NiCrFe alloy control rod guide tube support pins with strain hardened austenitic stainless steel support pins. This replacement will take place prior to entering the period of extended operation.

FNP has replaced a selected pattern of baffle / former bolting determined to be the minimum required to maintain structural integrity during all design conditions. These new bolts are fabricated from strain hardened 316 stainless steel and incorporate geometric improvement in the bolt stress profile.

B.5.1.6 Conclusion

The implementation of the Reactor Internals Program will provide reasonable assurance that the reactor internals components will continue to perform their intended function(s) during the period of extended operation.

B.5.2 FLUX DETECTOR THIMBLE INSPECTION PROGRAM

B.5.2.1 Program Description

The new Flux Detector Thimble Inspection Program will be a formalization of the examination process currently performed at FNP. It will be used to identify loss of material resulting from fretting/wear in the detector thimbles during the period of extended operation.

B.5.2.2 NUREG-1801 Consistency

This is a plant-specific program not specifically addressed in NUREG-1801.

B.5.2.3 Program Scope

The FNP program will include flux detector thimbles for both units which, although they form part of the reactor coolant pressure boundary, are exempted from ASME Section XI as instrumentation. It does not include the instrument guide tubes, which are covered under the ISI Program and the Reactor Vessel Internals Program.

B.5.2.4 Preventive Actions

There are no preventive actions associated with this monitoring program.

B.5.2.5 Parameters Inspected or Monitored

Wall thickness measurements will be conducted to detect loss of material from the flux detector thimbles.

B.5.2.6 Detection of Aging Effects

Eddy Current Testing (ECT) or other suitable examination methods will be used to detect loss of material from flux detector thimbles.

B.5.2.7 Monitoring and Trending

ECT results will be trended and wear rates will be calculated. Examination frequency will be based upon wear predictions.

B.5.2.8 Acceptance Criteria

Results of the flux thimble inspections will be evaluated using a wear rate formula to determine the earliest projected date that a detector flux thimble can be anticipated to exceed the wall thickness limit.

B.5.2.9 Corrective Actions

Flux detector thimbles will be repositioned, capped, or replaced depending on the volumetric examination results. Condition Reports will be written to document any loss of material noted during the examinations.

B.5.2.10 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.5.2.11 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.5.2.12 Operating Experience

There is no programmatic operating experience for this new program. However, there is industry and plant specific operating history related to loss of material from flux detector thimbles in Westinghouse reactors.

In IE Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors," the NRC requested that licensees implement a flux detector thimble tube inspection program. By 1989, FNP had a testing program consistent with IEB 88-09 and approved by the NRC. ECT began to reveal loss of material due to wear from multiple incore detector guide thimbles.

The Unit 1 detector guide thimbles were replaced during 1R15 with chrome-coated, strain-hardened stainless steel thimbles. For Unit 2, the most recent flux thimble eddy current data evaluation indicates that no repositioning or capping will be required.

B.5.2.13 Conclusion

While FNP characterizes this as a new aging management program due to the need to formalize current practices, the commitments made in response to IEB 88-09, coupled with satisfactory operating experience, provide reasonable assurance that the reactor coolant pressure boundary function of the flux detector thimbles will be maintained during the period of extended operation.

B.5.3 EXTERNAL SURFACES MONITORING PROGRAM

B.5.3.1 Program Description

The External Surfaces Monitoring Program is a new plant-specific condition monitoring program that will be implemented through periodic visual inspections of external surfaces of carbon steel, low alloy steel and other susceptible materials in components requiring aging management for license renewal.

B.5.3.2 NUREG-1801 Consistency

The FNP External Surfaces Monitoring Program is the plant specific program suggested in NUREG-1801 for managing the loss of material from the external surfaces of components included within the scope of license renewal.

B.5.3.3 Exceptions to NUREG-1801

This is a plant-specific program not specifically addressed in NUREG-1801.

B.5.3.4 Program Scope

The FNP External Surfaces Monitoring Program will employ visual inspection to manage accessible and insulated external surfaces susceptible to loss of material that require aging management for license renewal. Susceptible external surfaces include carbon steel and low alloy steels in inside and outside environments, and galvanized steel, cast iron, copper alloys, and aluminum in an outside environment.

The FNP External Surfaces Monitoring Program is credited for managing loss of material in the external surfaces of specific component/commodity groups in the following LRA systems:

- Closed Cooling Water Systems
- Main Steam
- Demineralized Water System
- Compressed Air System
- Control Room Area Ventilation
- Emergency Diesel Generator
- Containment Spray
- Hydrogen Control System
- Open Cycle Cooling Water
- Primary Containment HVAC
- Oil-Static Cable Pressurization System
- Yard Structures HVAC
- Reactor Makeup Water Storage
- Spent Fuel Pool Cooling and Cleanup
- Auxiliary and Radwaste Area Ventilation
- Auxiliary Feedwater
- Containment Isolation System
- Diesel Fuel Oil
- Fire Protection
- Emergency Core Cooling Systems
- Liquid Waste and Drains
- Potable and Sanitary Water
- Sample System
- Electrical Components
- Chemical and Volume Control System

The FNP External Surfaces Monitoring Program is also credited for managing loss of material, cracking and change in material properties in elastomer flexible hoses used in the Oil-Static Cable Pressurization System.

B.5.3.5 Preventive Actions

The FNP external surfaces monitoring activities will include actions to monitor and report conditions. There will be no preventive actions credited for these activities.

B.5.3.6 Parameters Inspected or Monitored

Surface conditions of selected equipment and components will be monitored by plant personnel for signs of corrosion or wear. Periodic inspections of accessible portions of piping and tubing will be performed to detect signs of loss of material, flange leakage, missing or damaged insulation, damaged coatings, and fretting of tubing. Inspections of insulated surfaces will be on a sampling basis and target areas identified by baseline documentation and operating experience as most susceptible. Accessible in-scope polymers or elastomers will also be inspected for age-related degradation.

B.5.3.7 Detection of Aging Effects

Visual inspections will be conducted, typically by walkdowns intended to be performed such that at a minimum, all accessible (non-insulated) portions of a system are observed on a regular basis.

B.5.3.8 Monitoring and Trending

Baseline documentation for the condition of the managed external surfaces will be established prior to the beginning of the extended period of operation. The baseline information may be established through compilation of existing information already contained in the CR database, engineering support records or other records. If a satisfactory representative baseline cannot be established using existing information, then additional special inspections will be performed prior to the beginning of the extended period of operation.

Degradation of external surfaces will be monitored and trended in accordance with established procedures and guidelines. The frequency of inspection is subject to modification based on plant specific environments or observed degradation. Such observations may dictate that an increased or decreased inspection rate would be prudent for a particular system, component or area. Repetitive failures will be addressed by reviewing the inspection results and task content, and frequency will be adjusted as necessary to preclude component failures.

B.5.3.9 Acceptance Criteria

Acceptance criteria will be contained in the applicable inspection or examination procedures. These criteria will be directly correlated to the indications of aging effects requiring management.

B.5.3.10 Corrective Actions

If inspection results are unacceptable, as determined by engineering review, corrective actions will be taken to refurbish or replace the affect component. Condition Reports will be written to document any unacceptable result.

B.5.3.11 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.5.3.12 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.5.3.13 Operating Experience

This is a new program for which programmatic operating experience is not applicable.

B.5.3.14 Conclusion

Implementation of the new plant-specific External Surfaces Monitoring Program prior to the beginning of the period of extended operation will provide reasonable assurance that the loss of material on the external surfaces of carbon steel, low alloy steel and other susceptible materials in components requiring aging management will be adequately managed such that the intended functions of the applicable components will be maintained during the period of extended operation.

B.5.4 BURIED PIPING AND TANK INSPECTION PROGRAM

B.5.4.1 Program Description

The new FNP Buried Piping and Tank Inspection Program will be used to manage loss of material from the external surfaces of pressure-retaining buried carbon steel piping and tanks. Preventive measures have been put in place in accordance with standard industry practices for external coatings and wrappings. Buried piping and tanks will be inspected when they are excavated for maintenance or when those components are exposed for any reason. FNP will implement this new program prior to the period of extended operation.

The scope of the FNP Buried Piping and Tank Inspection Program includes the external surfaces of the following buried components:

- Service water piping
- Emergency diesel generator fuel oil storage tanks and fuel oil transfer piping
- Fire protection piping
- Oil-static Cable Pressurization System buried components from the high voltage to the low voltage switchyard

B.5.4.2 NUREG-1801 Consistency

The FNP program attributes will be consistent with those described in NUREG-1801, Chapter XI.M34.

B.5.4.3 Exceptions to NUREG-1801

None

B.5.4.4 Enhancements

None

B.5.4.5 Operating Experience

This is a new program. Therefore, no programmatic operating experience has been gained. Leaks in buried piping systems at FNP have typically resulted from localized damage to the external coating/wrapping on carbon steel piping, such as from a rock or mechanical damage during installation. FNP has been successful at detecting these leaks prior to any loss of system function.

B.5.4.6 Conclusion

Implementation of the new FNP Buried Piping and Tank Inspection Program prior to the period of extended operation will provide reasonable assurance that the effects of aging on the pressure-retaining function of those components will be maintained during the period of extended operation.

B.5.5 ONE-TIME INSPECTION PROGRAM

B.5.5.1 Program Description

The new FNP One-Time Inspection Program 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. Insofar as practical with respect to scheduled outages, the inspections will be performed within a window of five years immediately preceding the extended period of operation.

The new FNP One-Time Inspection Program will be used for cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely disprove the effect, or (b) an aging effect is expected to progress very slowly and not require management during the period of extended operation. The new FNP One-Time Inspection Program will also be used to verify the effectiveness of other aging management programs (AMP) to confirm the absence of an aging effect.

The new program will include in the sample set those components requiring aging management which are made of cast iron, bronze, brass and other alloys that are exposed to environments that may lead to selective leaching of one of the metal constituents. In addition to one time visual inspection, some components constructed from the aforementioned materials will be subjected to hardness testing.

B.5.5.2 NUREG-1801 Consistency

The FNP One-Time Inspection Program will include elements to make it consistent with the acceptable programs described in NUREG-1801, Sections XI.M32 and XI.M.33. As indicated in NUREG-1801 XI.M32, one-time inspection, or any other action or verification program, is to be reviewed by the staff on a plant-specific basis. Therefore, the FNP One-Time Inspection Program is presented in the plant-specific program format (discussion of all 10 program attributes described in NUREG-1800) for the purpose of staff review.

B.5.5.3 Exceptions to NUREG-1801

None

B.5.5.4 Enhancements

None

B.5.5.5 Program Scope

The systems or components listed below will be included in the sample set of components that will be compiled based upon (a) determination of the sample size based on an assessment of materials of fabrication, environment, 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 managing the aging effect for which the component is examined; and (d) evaluation of the need for follow-up examinations to monitor the progression of any aging degradation.

Specific Components Included in Sample Population

- Pressurizer cast austenitic stainless steel spray heads and associated coupling / lock bar
- Reactor coolant system small bore (< 4 NPS), butt-welded piping
- An RCP thermal barrier CCW nozzle
- Cast iron, bronze, brass and other alloy components in any system requiring aging management that are exposed to environments that may lead to selective leaching
- A bounding CVCS letdown orifice or Charging / SI Pump mini-flow orifice (based on pressure drop)
- Sample portion of the external surface of the service water piping in the Diesel Generator Building which is obscured by guard piping

General LRA Systems In-scope

Closed Cooling Water Systems	Spent Fuel Pool Cooling and Cleanup
Reactor Coolant System	Emergency Core Cooling Systems
Main Steam	Auxiliary and Radwaste Area Ventilation
Reactor Makeup Water Storage	Steam Generator Blowdown
Demineralized Water System	Auxiliary Feedwater
Auxiliary Steam and Condensate	Chemical and Volume Control System
Compressed Air System	Containment Isolation System
Control Room Area Ventilation	Diesel Fuel Oil
Emergency Diesel Generator	Fire Protection
Containment Spray	Feedwater System
Hydrogen Control System	Liquid Waste and Drains
Open Cycle Cooling Water	Potable and Sanitary Water
Primary Containment HVAC	Sample System

B.5.5.6 Preventive Actions

One-time inspection is an inspection activity independent of methods to mitigate or prevent degradation.

B.5.5.7 Parameters Inspected or Monitored

FNP will use appropriate inspection and testing methods to monitor selected components for loss of material, cracking, fouling, change in material properties and loss of fracture toughness, as applicable to the component selected.

B.5.5.8 Detection of Aging Effects

FNP will perform one time inspections on selected components using proven nondestructive examination (NDE) methods including visual, volumetric, surface techniques, and hardness testing, as applicable to the selected components. Procedures will require that inspections or tests be conducted by qualified personnel.

B.5.5.9 Monitoring and Trending

There is no monitoring or trending function associated with one-time inspections.

B.5.5.10 Acceptance Criteria

Acceptance criteria will be developed to detect relevant conditions of degradation and establish predetermined limits (where appropriate), such as a comparison of ultrasonic thickness measurements to design minimum wall thickness. Indications of degradation which exceed the acceptance criteria stated in procedures prepared for one-time inspections will be evaluated.

B.5.5.11 Corrective Actions

If inspection results are unacceptable, as determined by engineering review, corrective actions will be taken to repair or replace the affected components. Condition Reports will be written to document any unacceptable result.

B.5.5.12 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.5.5.13 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.5.5.14 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 component sample set.

B.5.5.15 Conclusion

The new one-time inspections will provide reasonable assurance that either an aging effect is not occurring, or the aging effect is occurring so slowly that the intended function of the component or structure is not affected. In either case there would be no need to manage an aging related degradation for the period of extended operation.

B.5.6 NON-EQ CABLES PROGRAM

The Non-EQ Cables Program consists of two parts. Section B.5.6.1 addresses non-EQ electrical cables used in circuits with sensitive, high voltage, low-level signals such as radiation monitoring and nuclear instrumentation. An AMP designed specifically for these types of cables will be implemented as an alternate program to the XI.E2 program described in NUREG-1801. Section B.5.6.2 addresses non-EQ electrical cables exposed to adverse localized environments caused by heat, radiation, or moisture and inaccessible medium voltage cables that are simultaneously exposed to significant moisture and voltage. This program section will be implemented consistent with GALL programs XI.E1 and XI.E3.

B.5.6.1 Non-EQ Electrical Cables Used in Instrumentation Circuits (Alternate XI.E2)

B.5.6.1.1 Program Description

The FNP Non-EQ Cables Program is a new inspection and testing program that will be implemented prior to the period of extended operation. It will be used to maintain the function of electrical cables which are not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, but are exposed to adverse localized environments caused by heat, radiation or moisture. FNP considered Interim Staff Guidance (ISG) -05 in preparation of the attributes for this new program.

The FNP program will provide reasonable assurance that these cable functions will be maintained through the period of extended operation.

B.5.6.1.2 NUREG-1801 Consistency

The aspect of the FNP Non-EQ Cables Program described in this section (B.5.6.1) is consistent with the program described in section XI.E2 of NUREG-1801 with the exception that FNP will incorporate program details applicable to the specific types of cables within the scope of the program in accordance with the alternate E.2 program developed by the License Renewal Electrical Working Group.

B.5.6.1.3 Program Scope

The scope of this section of the FNP Non-EQ Cables Program will include the following components:

- Electrical cables used in circuits with sensitive, high voltage, low-level signals such as radiation monitoring and nuclear instrumentation.

B.5.6.1.4 Preventive Actions

This testing program includes no actions to prevent or mitigate aging degradation.

B.5.6.1.5 Parameters Inspected or Monitored

A representative sample of instrument circuit cables with sensitive, high voltage, low-level signals which are installed in adverse localized environments will be tested. Parameters monitored will be determined from the type of test performed and will be specific to radiation monitoring and nuclear instrumentation circuits. The technical basis for the sample will be documented.

B.5.6.1.6 Detection of Aging Effects

A representative sample of instrumentation circuit cables with sensitive, high voltage, low-level signals which are installed in adverse localized environments will be tested at least once every 10 years. The type of test performed will be applicable to radiation monitoring and nuclear instrumentation circuits. The first test will be completed before the beginning of the period of extended operation.

B.5.6.1.7 Monitoring and Trending

Monitoring and trending are not included in this program. Industry data indicates the ability to trend results is limited.

B.5.6.1.8 Acceptance Criteria

The acceptance criteria for each test performed on radiation monitoring and nuclear instrumentation circuits will be defined by the specific type of test performed and the specific cable tested.

B.5.6.1.9 Corrective Actions

An evaluation will be performed on radiation monitoring and nuclear instrumentation cables when the test acceptance criteria are not met in order to ensure that the intended functions will be maintained. When an unacceptable condition or situation is identified, a determination will be made as to whether the same condition or situation is applicable to other high voltage, low-level signal circuits exposed to similar adverse localized environments.

FNP initiates corrective actions in a manner consistent with the corrective actions described in NUREG-1801, Branch Technical Position RLSB-1 in Section A.1.2.3.7 of NUREG-1800 and 10 CFR Part 50, Appendix B.

B.5.6.1.10 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.5.6.1.11 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.5.6.1.12 Operating Experience

The Non-EQ Cables Program is a new program with no operating experience history. However, effective and proven testing techniques will be used for this new program. Lessons learned during the performance of this program, additional industry experience, and other testing techniques developed in the industry will be considered.

Industry operating experience has shown that exposure to heat and radiation results in the degradation of insulating materials. Testing of cables that have been exposed to heat and radiation can provide a possible indication of potential electrical cable degradation.

In addition to industry operating experience SNC investigated the FNP operating history for in-scope electrical components using condition report (CR) searches, internal correspondence, plant walkdowns and interviews.

B.5.6.1.13 Conclusion

This section of the new FNP Non-EQ Cables Program will provide reasonable assurance that the intended function(s) of non-EQ electrical cables which are used in sensitive, high voltage, low-level signal circuits and exposed to adverse localized environments caused by heat or radiation will be maintained consistent with the current licensing basis for the period of extended operation.

B.5.6.2 Non-EQ Electrical Cables Exposed to Adverse Localized Environments and Inaccessible Medium Voltage Cables (XI.E1 and XI.E3)

B.5.6.2.1 Program Description

The FNP Non-EQ Cables Program is a new inspection and testing program that will be implemented prior to the period of extended operation. It will be used to maintain the function of electrical cables which are not subject to the environmental qualification (EQ) requirements of 10 CFR 50.49, but are exposed to adverse localized environments caused by heat, radiation or moisture.

Except for inaccessible medium voltage cables, this inspection and testing program includes no actions to prevent or mitigate aging degradation. For medium voltage cables, periodic inspections for water accumulation in cable pull boxes will be conducted and water will be drained as necessary.

The FNP program will provide reasonable assurance that the intended function of these cables will be maintained through the period of extended operation.

B.5.6.2.2 NUREG-1801 Consistency

This section of the FNP Non-EQ Cables Program is consistent with the programs described sections XI.E1 and XI.E3 of NUREG-1801.

B.5.6.2.3 Exceptions to NUREG-1801

None

B.5.6.2.4 Enhancements

None

B.5.6.2.5 Operating Experience

The Non-EQ Cables Program is a new program with no operating experience history. However, as noted in NUREG-1801, industry operating experience has shown that adverse localized environments caused by heat, radiation, moisture, or a combination of moisture and voltage can cause the degradation of electrical cables. In addition, industry operating experience has shown that the degradation of cable insulation caused by heat and radiation can be observed visually. The Non-EQ Cables Program will use effective and proven inspection techniques. Lessons learned during the performance of this program, additional industry experience, and other testing techniques developed in the industry will be considered.

In addition to industry operating experience, SNC investigated the FNP operating history for electrical components within the scope of license renewal using condition report (CR) searches, internal correspondence, plant walkdowns and interviews. These reviews revealed that some medium voltage cables within the scope of license renewal at FNP have been exposed to a wetted condition. However, no adverse effects have been observed.

B.5.6.2.6 Conclusion

The new FNP Non-EQ Cables Program will manage the effects of aging of electrical cables within the scope of the program such that the intended function(s) of the cables is maintained consistent with the current licensing basis for the period of extended operation.

B.5.7 FATIGUE MONITORING PROGRAM

B.5.7.1 Program Description

The new Fatigue Monitoring program will be used to monitor fatigue conditions of the metal piping and components that form the reactor coolant pressure boundary (RCPB). Specifically included will be the pressurizer subcomponents, the RPV shell and head, RPV inlet and outlet nozzles, reactor coolant piping, charging nozzles, safety injection nozzles and the other Class 1 piping one-inch in diameter or larger. The other Class 1 components that have received a fatigue analysis will also be included, since the cycles they were designed for are bounded by the cycle limits used by the program.

It should be noted that FNP currently conducts cycle counting using the Component Cyclic Transient Limit Program as required by the FNP Technical Specifications. SNC will modify the current manual counting method to use fatigue monitoring software to automatically count monitored cycles using installed plant equipment. The software has the capability to manually enter those cycles that cannot be automatically counted. By counting these cycles and demonstrating that current and projected cycles are less than were assumed in design fatigue calculations, SNC will demonstrate that those calculations remain valid and therefore the fatigue cumulative usage factor will remain below the ASME Section III design limit.

The cycle counting portion of the program will count plant transients that are significant contributions to the fatigue cumulative usage factor. Top and bottom mounted RTDs will be used to monitor locations susceptible to thermal stratification (NRC Bulletin 88-08) to verify that stratification is not occurring at those locations.

In addition to cycle counting, the fatigue monitoring software will be used to conduct stress based fatigue monitoring of the surge line and lower region of the pressurizer. This portion of the software calculates an estimate of the fatigue cumulative usage factor due to changes in temperature, pressure, or other parameters that affect the fatigue of those components. This portion of the software also accounts for insurge/outsurge and thermal stratification effects.

B.5.7.2 NUREG-1801 Consistency

The design basis metal fatigue analyses for the FNP reactor coolant pressure boundary are TLAAs. Consistent with Chapter X of NUREG-1801, under Section X.M1, SNC has selected fatigue monitoring as an acceptable option for managing cracking due to metal fatigue for components in the reactor coolant pressure boundary (demonstration per 10 CFR 54.21(c) (1) (iii)). SNC will rely on this fatigue monitoring program to manage fatigue cracking in conjunction with a demonstration that the number of cycles assumed in the design basis transients remains bounding for the extended period of operation.

As described in Section 4.3.1 of this application, SNC has evaluated the effects of environmentally assisted fatigue on piping and components comparable to the locations evaluated in Section 5.4 of NUREG/CR-6260. The program will include monitoring for thermal stratification at susceptible locations in addition to the current transient counting required by Technical Specifications.

B.5.7.3 Exceptions to NUREG-1801

None

B.5.7.4 Enhancements

None

B.5.7.5 Operating Experience

In 1987, FNP Unit 2 experienced a through wall leak on a short, unisolable section of emergency core cooling system (ECCS) piping that is connected to the cold leg of loop B in the RCS. This event led to the issuance of NRC Bulletin 88-08. Since then, the cycle counting and monitoring methods that preceded the new FNP Fatigue Monitoring Program have steadily improved. Significant effort has been put into establishing accurate baseline cycle counts. In addition, FNP has recently purchased and installed an industry-recognized computer program to improve fatigue monitoring capabilities.

The FNP Operating Experience Program is used to review industry experience, and to disseminate information to the rest of the industry. For example, the information contained in NRC Bulletins 88-08 and 88-11 has been incorporated into the FNP fatigue monitoring plan, as have the guidelines from EPRI MRP-24 and EPRI MRP-47.

B.5.7.6 Conclusion

Implementation of the new FNP Fatigue Monitoring Program prior to the period of extended operation, together with the continued implementation of the existing subprograms, will provide reasonable assurance that metal fatigue will be adequately managed such that the intended function(s) of the applicable structures and components will be maintained during the period of extended operation.

B.5.8 NiCrFe COMPONENT ASSESSMENT PROGRAM

B.5.8.1 Program Description

The NiCrFe Component Assessment Program will be 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. This new program will assess nickel base alloy component susceptibility to PWSCC and provide for any required augmented inspection requirements to ensure that the component functions will be maintained during the period of extended operation.

Based on the results of nickel alloy component assessments, the inspections normally accomplished under the FNP Inservice Inspection Program and Borated Water Leakage Assessment and Evaluation Program may be enhanced with additional inspection activities.

SNC supports development of improved industry data, models, and inspection methodologies through active participation in the EPRI Materials Reliability Program Alloy 600 Issue Task Group and the Westinghouse Owners Group.

B.5.8.2 NUREG-1801 Consistency

The new FNP NiCrFe Component Assessment Program is a plant-specific program. While some elements are consistent with the intent of the program described in NUREG-1801, Section XI.M11, recent industry events and FNP plant specific issues result in a more global program focus than that in NUREG-1801, Section XI.M11.

B.5.8.3 Exceptions to NUREG-1801

While containing some of the same program elements described in NUREG-1801, Section XI.M11, no exceptions are noted since this program is evaluated as a plant specific program.

B.5.8.4 Program Scope

The FNP program scope includes nickel base alloy reactor coolant pressure boundary components with known or potential susceptibility to PWSCC, excluding steam generator tubes, which are specifically addressed by the Steam Generator Program, and Reactor Internals which are addressed by the Reactor Vessel Internals Program.

B.5.8.5 Preventive Actions

The NiCrFe Component Assessment Program does not contain any direct preventive or mitigating attributes. However, the Water Chemistry Control Program provides prevention attributes. Material replacement is also an available option to prevent or mitigate the potential for PWSCC.

B.5.8.6 Parameters Inspected or Monitored

The FNP program will not directly inspect or monitor cracking within NiCrFe alloy components. The program assessment will utilize the most current industry susceptibility models to develop a set of plant specific inspection requirements to address potential PWSCC in FNP NiCrFe components.

B.5.8.7 Detection of Aging Effects

This assessment program will not directly detect or size PWSCC cracks within NiCrFe components. However, the program will be used to recommend augmented inspection locations, schedules and techniques based upon the capability of detecting tight PWSCC type cracks prior to any loss of component intended function. Inspection methods may include visual, surface, or volumetric methods.

B.5.8.8 Monitoring and Trending

The cracking susceptibility assessment, subsequent identification of enhanced inspection requirements, and any initial inspections will be performed for both Units 1 and 2 prior to entering the period of extended operation. Updates to the susceptibility assessment and inspection plans will be based upon new or improved industry data, susceptibility models, and operating experience. The frequency of subsequent inspections, and the inspection methodologies utilized, will be based on the results of any initial inspections.

Program inspections will be integrated with FNP ISI Program inspections and results will be tracked within the FNP ISI Plan.

B.5.8.9 Acceptance Criteria

Acceptance criteria for any flaws identified will be based upon ASME Section XI requirements or other acceptable fracture mechanics methods. If the flaw is to remain in service, the acceptance evaluation will consider component stresses, updated crack growth rate models, and material toughness.

B.5.8.10 Corrective Actions

Updated susceptibility assessments and inspection plans will be developed based on inspection results. Component repair and replacement procedures are in accordance with ASME Section XI requirements. FNP will continue compliance with the requirements of 10CFR 50, Appendix B to address corrective actions.

B.5.8.11 Confirmation Process

The FNP Corrective Actions Program addresses confirmation processes, ensuring that preventive actions and appropriate corrective actions are adequate.

B.5.8.12 Administrative Controls

Quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with 10 CFR 50 Appendix B as part of the FNP Corrective Actions Program.

B.5.8.13 Operating Experience

SNC is in the process of procuring replacement RPV Heads, and will replace them prior to entering the period of extended operation. These replacement RPV heads will utilize thermally treated Alloy 690 base metal, with Alloy 52 / 152 weld metal for all head penetrations.

Thermally treated (TT) Alloy 690 base metal and Alloy 52 / 152 weld metals have been shown in experimental testing to exhibit a high resistance to PWSCC when compared with mill annealed (MA) Alloy 600 base metal and Alloy 82 / 182 weld metals. These improved materials have been utilized for replacement steam generator tubes, tube sheets, and penetrations. There have been no instances of cracking of Alloy 690TT tubes or sleeves in service at any U.S. plant. The only indications of any type of tube degradation of Alloy 690TT steam generator tubes have been wear-related. There is little field data available regarding the performance of Alloy 690TT and Alloy 52 / 152 materials in RPV head applications.

Regarding the remaining Alloy 600 MA and Alloy 82 / 182 materials in service, to date, FNP has not identified any PWSCC related degradation.

B.5.8.14 Conclusion

Implementation of the new NiCrFe Component Assessment Program to address PWSCC concerns in nickel alloy materials will provide adequate susceptibility assessments to support development of inspection plans to ensure that NiCrFe components are adequately inspected. These activities provide reasonable assurance that PWSCC will be adequately managed such that the intended function(s) of the affected components will be maintained consistent with the CLB during the period of extended operation.

B.6.0 REFERENCES

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

2. NUREG-1801, Generic Aging Lessons Learned (GALL) Report, U.S. Nuclear Regulatory Commission

3. Joseph M. Farley Technical Specifications, Units 1 and 2

4. NRC Interim Staff Guidance (ISG)-04, Aging Management of Fire Protection Systems for License Renewal, December 3, 2002.

5. NRC Interim Staff Guidance (ISG)-05, Interim Staff Guidance on the Identification and Treatment of Electrical Fuse Holders for License Renewal, March 10, 2003